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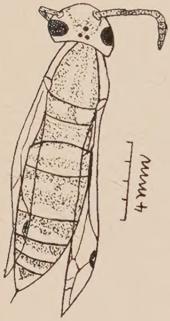


Fig. 1

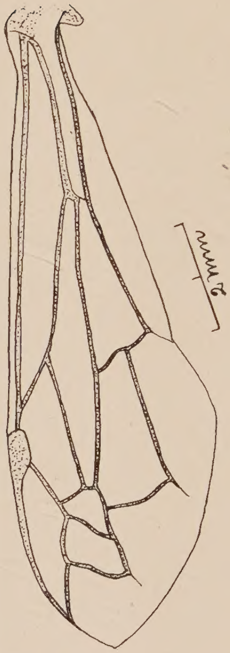
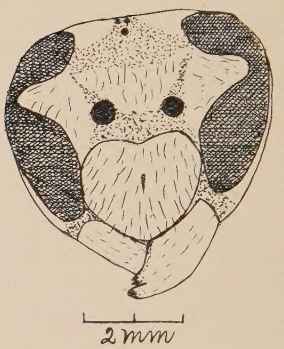


Fig. 3



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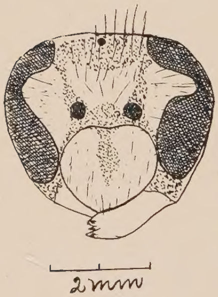

Fig. 2

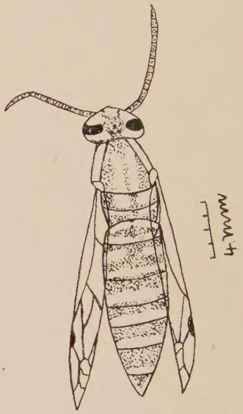

Fig. 6

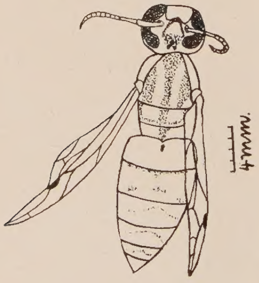

Fig. 5

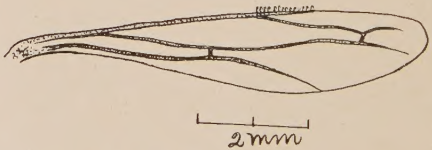

Fig. 7

TURNER: VESPA CAROLINA.

THE WORKERS OF *VESPA CAROLINA* DR. RESEMBLE IN COLORATION THE MALES. A CORRECTION.

BY C. H. TURNER, AUGUSTA, GEORGIA.

H. W. Lewis in his paper[1] on the "Vespinae of the United States and Canada," says that the worker of *Vespa carolina* is similar to the female though smaller. This is an error which it is the purpose of this article to correct. The color pattern of the worker is similar, not to that of the perfect female, but to that of the male.

The above statement is based upon a careful study of the contents of a large nest of *Vespa carolina* Dr. which I dug out of a red clay bank in Atlanta, Ga., October 10, 1904. The nest was six stories high and contained several hundred workers, several hundred males and several dozen perfect females, besides numerous young in all stages of development.

The color pattern of the perfect female tallies well with that published by Lewis (l. c., p. 180), hence it is evident that Lewis and I are discussing the same species. Since I captured my specimens in the nest, it is evident that the males and workers in my possession belong to the same species as the perfect females. A study of this nest would enable even a casual observer to note that the worker resembles in color pattern, not the perfect female but the male. Indeed, the workers and perfect females are so unlike that one capturing the two in the field, and having no clue to their identity save Lewis' paper, would assign them to two distinct species. It is in the color pattern of the abdomen that the contrast is noticed; although even on the head the pattern is not the same on that of the worker and perfect female.

A description of the perfect female is omitted from this article because such a description would be merely a repetition of Lewis' work. The black and white figure of the perfect female [fig. 5] which accompanies this paper will serve to show how unlike the worker [fig. 1] it is. The usual length of the females in this nest was 21 mm., but some specimens were only 19 mm. long. The head varied in length from 2 mm. to 3 mm., in width from 5.5 mm. to 6. mm., in height from 5.5 mm. to 6 mm. The thorax varied in length from 6 mm., to 7 mm., in width from 6 mm. to 6.5 mm., in height from 6 mm. to 6.5 mm. The abdomen varied in length from 11 mm. to 13.5 mm., in width from 6 mm. to 8 mm., in height from 5.75 mm. to 6 mm.

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[1] Trans. Amer. Ent. Soc., vol. XXIV, June, 1897, p. 180.

Description of the Worker [Plate I, Fig. 1].

Head black or very dark brown; with the mandibles (except a narrow margin), the clypeus (except a large arrow-shaped mark in the middle), a somewhat triangular spot on front, the sinus and the space above and behind the eye yellow [in some cases the yellow has a brownish tinge]. Antennae black, with the scape yellow in front and the flagellum sometimes slightly brownish beneath. Thorax dark-brown to black; with the posterior border of the prothorax, a more or less narrow line in front, two longitudinal stripes on the mesothorax, the borders of the tegulae, the scutellum (except a median line) a transverse line on the post-scutellum, two large irregular spots on the metathorax, a broad band on the mesopleura, two spots on the metapleura yellow. Abdomen black or a very dark brown, with a narrow transverse band on the posterior border of each segment, a narrow transverse band on the anterior border of the first segment, and a narrow transverse band across the second segment, a transverse band across the posterior margin of the ventral side of each segment and large blotches on the ventral side of the second segment yellow. The transverse band across the middle of the dorsal surface of the second segment is slightly ferruginous and is interrupted in the middle; legs yellow, more or less tinged with ferruginous, anterior border of femur brown to black, wings smoky with nervures brown.

The length of the workers of this nest ranged from thirteen to fifteen millimeters. The length of the head was 2 mm., the width from 4 mm. to 5 mm., the height from 3.5 mm. to 4 mm. The length of the thorax was from 4 mm. to 5 mm., the width 4 mm., the height 4 mm. The length of the abdomen was 7 mm. to 9 mm., the width from 4 mm. to 5 mm., the height 3.5 mm. to 4 mm.

Description of the Male [Fig. 6].

The coloration of the head is similar to that of the worker, but the dark blotch is absent from the clypeus. The coloration of the thorax is similar to that of the worker, but the yellow is absent from the metathorax. From the dorsal aspect the coloration of the abdomen is similar to that of the worker. The coloration of the ventral side of the abdomen is similar to that of the worker but the ground plan is more reddish and the yellow markings less distinct. Indeed throughout the yellow is more indistinct on the male than on the female.

Explanation of Figures, Plate I.

Fig. 1 — Worker *Vespa carolina* Dr.
Fig. 2 — Head of the worker *Vespa carolina* (front view).
Fig. 3 — Front wing of *Vespa carolina*.
Fig. 4 — Head of the female *Vespa carolina* (front view).
Fig. 5 — Female *Vespa carolina*.
Fig. 6 — Male *Vespa carolina*.
Fig. 7 — Hind wing of *Vespa carolina*.

Haines Normal School,
Augusta, Ga., Nov. 1st, 1907.

RECENT ENTOMOLOGICAL LITERATURE.

Mosquito Life.— By Evelyn Groesbeeck Mitchell. G. P. Putnam's Sons, New York and London. The Knickerbocker Press, 1907, 281 pp. illus., plates.

This is an interesting book upon a very important subject. When we consider that the mosquito is one of the great carriers of diseases, we should inform ourselves on this subject for self protection. Since the discovery that the mosquito is a transmitter of diseases, volumes, we might say, have been written, but many of these valuable papers are either scattered and inaccessible, or too technical for the average reader. The authoress has succeeded in presenting a very clear and condensed account of our present knowledge of this great subject. The work is well arranged, with good typography and numerous excellent illustrations. The volume embraces chapters on: Systematic position and structure; Habits; How far mosquitoes fly; The larvae and pupae; The transmission of malaria, yellow fever and other diseases; Remedies and enemies; Notes on the commoner species. Collecting and laboratory methods, and keys to identify not only the adults, but also the eggs, larvæ and pupæ, followed by a systematic list of the genera and species. The book closes with an appendix — Mosquito and Leprosy — in which some theories bearing on the transmission of this disease are discussed. The work is dedicated to the memory of Dr. James William Dupree.

C. W. J.

TWO NEW MUTILLIDAE FROM COLORADO.

BY T. D. A. COCKERELL AND S. A. ROHWER.

Ephuta sparsiformis n. sp.

♀. Length 10¼–12¼ mm.; head round, not quite as wide as thorax; scape with large deep punctures; first joint of flagellum not so long as 2+3; mandibles strongly tridentate; thorax moderately elongate, narrowed behind; coxæ, trochanters and femora with strong punctures; four posterior tibiae with robust black spines; head and thorax with large, deep, dense punctures, those on the face not so deep, those on the posterior face of metathorax somewhat elongate; first abdominal segment sessile on second; its ventral carina evident, terminating abruptly, but neither bifid nor with a terminal tooth; pygidium longitudinally striated on upper two-thirds, the lower third minutely roughened; abdomen punctured in the same general manner as the thorax, but the punctures on second segment elongate.

Color bright ferruginous; with the antennae, legs, base and apex of second abdominal segment (the apex narrowly, wider in the middle), and the segments after the second, all black; face below antennae, and first abdominal segment dark rufous; mandibles black apically, rufous basally; vertex, face, thorax above and second abdominal segment with appressed golden-red pubescence; legs, apices of abdominal segments, except first, and venter to some extent with glittering pale yellowish hair; the light abdominal bands are strongly developed, except the first, which is broadly interrupted subdorsally, being thus divided into three parts; scattered over the insect (including the second abdominal segment) are long erect black hairs; first abdominal segment with many such hairs.

Hab.— Boulder, Colorado, 1907 (*T. D. A. Cockerell*). One without further data, the other from the Campus of the University of Colorado, Sept. 9. This belongs to Fox's group *simillima,* in which it runs to *aectis* Fox. It differs from *aectis* (which is from Florida) by the color of the femora and various other characters.

Superficially, it looks like several members of the *occidentalis* group of Fox, and if sought for in Fox's table of that group, would run to *E. sparsa.* From *sparsa* it may be known by the tridentate mandibles and the form of the ventral carina. The same characters separate it from *E. ferrugata,* which it also greatly resembles. It is also distinct from *ferrugata* by the closer and more elongate punctures of the second abdominal segment, the divided light band on margin of that segment, the strongly yellowish (instead of white) hair on under surface and sides of head and thorax, and the somewhat more slender maxillary palpi. There is also a superficial resemblance to *E. bollii*, but that species has white hair on first abdominal segment, no long black hairs on second, glittering golden hairs at apex of abdomen, a much larger and more quadrate head, etc.

Photopsis anaspasia n. sp.

♀. Length about 7½ mm.; head round, not quite as wide as thorax; eyes convex, strongly polished, slightly oval, not visibly facetted; a small round tubercle above each antennal socket; scape about as long as next four joints together; third joint longer than fourth, and much longer than second; head rather densely punctured; mandibles simple; thorax short, moderately narrowed behind, with large deep dense punctures; femora robust, slightly swollen in the middle; tibiæ large, somewhat flattened, with stout ferruginous spines; femora with scattered small punctures, but they are quite numerous and stronger on posterior face of hind femora; abdomen broad, first segment sessile on second; second with deep punctures, which are neither confluent nor elongated; carina on first ventral segment distinct, prominent but obtuse anteriorly; pygidium large, strongly margined, delicately longitudinally striate, except the apical fourth.

Ferruginous; narrow apex of second abdominal segment, and the segments following, and the femora and tibiæ, black or nearly so; antennæ ferruginous; head and scape with appressed white pubescence; thorax and second abdominal segment above with appressed golden-red pubescence, that on the second abdominal segment not so dense as that on thorax; apex of second and following segments fringed with dense white hair, except that in the middle of 3 to 5 the hair is dark brown, forming a large patch, which however does not reach the second segment; scape, occiput, prothorax, sides of thorax, legs and underside of abdomen with long white hairs; an elongate tuft of white hair on each extreme side of second segment; maxillary palpi light ferruginous; apical half of mandibles black.

Hab.— Boulder, Colorado, May 22, 1907 (*T. A. D. Cockerell*).

P. anaspasia belongs in Fox's group *anthophoræ*, and runs in his table, except as to structure of antennæ, to *aspasia* or *phaedra*, but does not agree with the description of either of these. The color is too red for *aspasia*, the antennæ are not fuscous, and *aspasia* has no patch of dark hair before the apex of abdomen. From *phaedra* it is distinguished by the color of the antennae and abdominal pubescence. In Melander's table for the same group (Trans. Amer. Ent. Soc., 1903, p. 319) it runs near to *P. impar*, but differs entirely in the color of the hair on second abdominal segment.

OUTLINE LIFE–HISTORY OF THE CHRYSOMELID *GASTROIDEA CYANEA* MELSHEIMER.

BY A. A. GIRAULT, WASHINGTON, D. C.

During late June, 1907, adults of this species were observed feeding on the leaves of a species of dock (*Rumex*) in a garden at New Richmond, Ohio. On June 28, a female beetle was captured which had a greatly swollen abdomen, and upon confinement in the laboratory, she deposited eggs in abundance. Other gravid females were likewise confined and from their eggs a second generation was obtained in July. These notes briefly record the general outline of the cycle, together with a description of the egg.

The Egg.

The eggs of this species are uniformly bright orange yellow (Gamboge), with one end rather conspicuously transparent in most cases. They are elongate oval in shape, the ends somewhat obtuse, and one side slightly concaved. The surface is glabrous and simple, and the micropyle inconspicuous. After several days the transparent end becomes concolorous, through expansion of the embryo. The eggs measure in length, 0.95 mm. They are deposited in conspicuous masses of from 20 to 40 on an average, side by side on the under surfaces of the leaves of dock, and perhaps (?) other weeds. The egg-masses are irregular in shape.

Table I. Duration of the Period of Incubation, July 2–11, 1907.

Lot No.	No. eggs.	Deposited.	Hatched.	Length Days.	hours.	Av. daily effective temperature.
1.	52	Noon, July 2	10 P. M., July 6	4	10	31.5° Fahr.
2.	40	10 A. M., July 5	10 P. M., July 9	4	12	36.1
3.	35	10:30 A. M., July 7	7 P. M., July 11	4	8½	37.1

The eggs were all of the first reared generation. They were confined in the laboratory in darkness, under the cover of paste-board boxes, and were supplied moisture by the daily addition of fresh foliage. The egg-masses found in nature were not exposed to the direct rays of the sun.

No parasite were obtained from 40 eggs found on dock July 2, all hatching by July 6.

POSTEMBRYONIC STAGES.

The larvae resemble in general aspect those of *Haltica chalybea* Illiger, but are not as robust. They are inclined to be gregarious during early life. Three larval ecdyses and four postembryonic instars occur during development.

Table II. Average Duration of Postembryonic Instars for a Generation, July, 1907.

No. eggs.	Hatched.	1st ecdysis. Instar I.	2nd ecdysis. Instar II.	Entered soil. Instar III.	Emerged. Pupal instar.	Total.	av. daily effective temperature.
52[1].	10 p.m., July 6	7 a.m., July 9	Noon, July 11	6 p.m., July 13	7 p.m., July 20		
		2 dys., 9 hrs.	2 dys., 5 hrs.	2 dys., 6 hrs.	7 dys. 1 hr.	13 dys., 21 hrs.	36.3° F.

The larvae were given an abundance of food and confined in the laboratory in an open glass jar filled with clay loam soil. They eat irregular patches of matter from the leaves. Pupation takes place beneath the soil.

Table III. Av. Width of the Head for Respective Larval Instars.

Instar:	I.	II.	III.
Greatest diameter, mm.	0.3735	0.6474	0.9960

DURATION OF LIFE CYCLE.

By combining Table II with Lot No. 1, Table I, the length of the life cycle for a single set of individuals is obtained as follows:

Table IV. Duration of life cycle for a single generation, July 2–20, 1907.

	Egg.		Larva.		Pupa (time in soil).		Life cycle	
No.	Days.	hours.	Days.	hours.	Days.	hours.	Days.	hours.
52	4	10	6	20	7	1	18	1

THE ADULTS.

Gravid females captured on their foodplant, growing in clay loam of a garden, on June 28th, July 1st and 7th, were confined in glass jars in the laboratory and supplied food daily. Table V summarizes. The three females were probably some days old when taken, so that the records probably fall short of the average. It is rather hazardous, however, to say even that, in the absence of extensive data, but analogy would lead me to believe that the number of eggs deposited, for instance, is much greater than the maximum here recorded, and so on for the other points involved. But reasoning by analogy is untrustworthy in these cases, and the records must stand for themselves.

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[1] Lot No. 1, table I.

Table V. Gravid females in confinement.

No.	1.	2.	3.
Date captured.	A. M., June 28th.	4 P. M., July.	10 A. M., July 7th.
Oviposition:	By July 1—181	Noon, July 2—52	Noon, July 7—33
	p., 3—41	a., 3—42	a., 8—81
	p., 4—62	p., 3—40	p., 9—27
	10a., 5—40	p., 4—89	By p., 11—13
	6p., 6—34	a., 6—43	p., 11—38
	a., 8—43	10:30 a., 7—35	a., 14—31
	p., 9—36		p., 15—35
	11—37		a., 16—32
	a., 14—34		
	a., 15—47		
	p., 15—64		
Eggs in ovaries at death	—15	 2	 5
Total number eggs deposited	—634	303	295
Died.	6 p., July 22.	July 13.	July 22.
Length period oviposition	June 30–July 15	July 2–July 7	July 7–July 16
Length of life	June 28–July 22	July 1–July 13	July 7–July 22

Note: a. and p. mean A. M. and P. M. respectively.

The adults of the reared generation, issuing at the average time of 7 P. M., July 20th, were confined together with food, and did not commence to mate until July 25th, feeding during the interval. At emergence, the two sexes are similar in appearance, but after mating the females become greatly swollen about the abdomen, giving them a characteristic appearance.

Two pairs were observed mating, presumably for the first time, on July 25th, and they were confined separately. The female of one pair deposited 211 eggs, from July 26–29, dying on August 3 without further deposition. The female of the other pair laid 412 eggs, from July 26 to August 5, dying on August 9. Many of the eggs deposited by these pairs failed to hatch. In nature the adults feed extensively on the foliage.

In regard to the number of generations in this locality, it appears that there is one in June or earlier and one in July. The first eggs were found early in June, and gravid females were observed in nature as late as July 24, 1907. Although these two generations are all that were observed occurring on *Rumex,* yet my observations were not extensive enough to say that there were not earlier or later ones.

I am under obligation to Mr. Eugene Amandus Schwarz, U. S. National Museum, for identification of the species.

NOTES ON HARRIS'S TYPES OF CYNIPIDAE.

BY WILLIAM BEUTENMÜLLER, NEW YORK CITY.

THROUGH the kindness of Mr. C. W. Johnson, I was enabled to examine the types of the species of Cynipidae described by the late Thaddeus William Harris, whose collection is in the Boston Society of Natural History.

RHODITES SEMIPICEUS (*Harris*).

Cynips semipiceus HARRIS, Rep. Ins. Mass. Inj. Veget. 1841, p. 400; Treat. Ins. New Engl. Inj. Veget. 2nd edit. 1852, p. 436; Treat. Ins. Inj. Veget. 3rd edit. 1862, p. 549; *ibid.* New Edit. Flint, 1862, p. 549; *ibid.* 1863, p. 549; *ibid.* 1880, p. 549.

One gall and one female adult are in the collection. The head and abdomen of the specimen are wanting, but from the remaining parts and the characteristic gall, the species may be recognized as being the same as *Rhodites fulgens* Gillette. Harris's species was heretofore erroneously considered to be a guest-fly (*Periclistis semipiceus*) of *Rhodites radicum* by the late R. von Osten Sacken.

The type gall is very similar to the one I figured in the Bulletin of the American Museum of Natural History, Vol. XXIII, 1907, plate XLVI, fig. 2. The galls may be found at or on the roots of *Rosa rubiginosa*, *Rosa humilis*, *Rosa carolina* and probably other species of wild roses.

RHODITES BICOLOR (*Harris*).

Cynips bicolor HARRIS, Rep. Ins. Mass. Inj. Veget. 1841, p. 399; Treat. Ins; New Engl. Inj. Veget. 2nd Edit. 1852, p. 435; Treat. Ins. Inj. Veget. 3rd Edit. 1862,

p. 548; Treat. Ins. Inj. Veget. New Edit. Flint, 1862, p. 548; *ibid.* 1863, p. 548. *ibid.* 1880, p. 548.

Two galls and one female in fairly good condition of this well known species are in the Harris collection.

Diastrophus dichlocerus (*Harris*).

Cynips dichlocerus Harris, Rep. Ins. Mass. Inj. Veget. 1841, p. 399; Treat. Ins. New Engl. Inj. Veget. 2nd Edit. 1852, p. 435; Treat. Ins. Inj. Veget. 3rd Edit. 1862, p. 549, pl. VIII, figs. 6, 7, 8; *ibid.* New Edit. Flint, 1862, p. 549; *ibid.* 1863, p. 549; *ibid.* 1880, p. 549.

One gall and one female in broken condition. Only the legs, abdomen and wings are extant. This species has been identified correctly by subsequent writers. It cannot be confounded with any other known American *Rhodites*.

Amphibolips confluens (*Harris*).

Cynips confluens (Harris). Rep. Ins. Mass. Inj. Veget. 1841, p. 397; Treat. Ins. New Engl. Inj. Veget. 2nd Edit. 1852, p. 433; Treat. Ins. Inj. Veget. 3rd Edit 1862, p. 546, pl. VIII, fig. 9, 10 and figs. 253, 254; *ibid.* New Edit. Flint. 1862, p. 546; *ibid.* 1863, p. 546; *ibid.* 1880, p. 546.

Two galls and one female gall-fly are in the collection. *Amphibolips spongific* O. S. is a synonym of *Cynips confluens*.

Amphibolips nubilipennis (*Harris*).

Cynips nubilipennis Harris, Rep. Ins. Mass. Inj. Veget. 1841, p. 398; Treat Ins. New Engl. Inj. Veget. 2nd Edit. 1852, p. 434; Treat. Ins. Inj. Veget. 3rd, Edit. 1862, p. 548; *ibid.* New Edit. Flint, 1862, p. 548; *ibid.* 1863, p. 548; *ibid.* 1880, p. 548.

Four galls and two females in good condition are in the collection. I have carefully compared Harris's types with Bassett's types of *Amphibolips sculptus* and find them to be one and the same species.

Callirhytis seminator (*Harris*).

Cynips seminator Harris, Rep. Ins. Mass. Inj. Veget. 1841, p. 399; Treat. Ins. New Engl. Inj. Veget. 2nd Edit. 1852, p. 434; Treat. Ins. Inj. Veget. 3rd. Edit. 1862, p. 548; *ibid.* New Edit. Flint, 1862, p. 548; *ibid.* 1863, p. 548; *ibid.* 1880, p. 548.

One gall and two female gall flies in good condition are extant. It is the well known white, wooly gall on the twigs of white oak (*Quercus alba*). It has been correctly identified by subsequent writers on Cynipidæ and placed in the genus *Callirhytis*.

SYNERGUS ONERATUS (*Harris*).

Cynips oneratus HARRIS, Rep. Ins. Mass. Inj. Veget. 1841, p. 398; Treat. Ins. New Engl. Inj. Veget. 2nd Edit. 1852, p. 434; Treat. Ins. Inj. Veget. 3rd Edit. 1862, p. 548; *ibid.* New Edit. Flint, 1862, p. 548; *ibid.* 1863; *ibid.* 1880.

Several galls and one adult in good state of preservation are in the collection. The gall is the product of *Holcaspis globulus* (Fitch) and the type of *oneratus* is a guest-fly of that species.

THE MALLOPHAGA OF THE WORLD: SYSTEMATIC SUMMARY.

BY VERNON L. KELLOGG, STANFORD UNIVERSITY, CALIF.

AFTER many tedious hours I have made an end of compiling a catalogue, with references to original descriptions, and with host and geographic records, of the Mallophaga of the world, for publication in Wytsman's Genera Insectorum. This is a highly needed work — not the list of Mallophaga, but the Genera Insectorum — and I suppose no sacrifice of time and happiness on the part of an entomologist is to be reckoned too great, if he can help further this larger enterprise. But doing the Mallophaga has approached, from my point of view, somewhere near the limit of this sacrifice.

Twelve hundred and fifty-seven species of these little parasites of birds and mammals have been described: 52 from mammal hosts and 1205 from birds. About one fourth of these are recorded from North American hosts, and of these approximately 300 species two thirds have been described as new, the other 100 being considered to be identical with species originally described from European, Asiatic or African hosts.

The order Mallophaga comprise twenty-seven genera, grouped into four families, constituting two sub-orders. Each sub-order includes a family found on bird hosts and one found on mammal hosts. However, a few species in the bird-infesting families are being found on mammals, especially on kangaroos and wallabies in Australia. Of course, in addition, a number of normally bird-infesting species have been found as stragglers on bird-catching mammals. The division of species among these genera is so extraordinary that I give it in detail in the following complete list of genera:

Sub-order Amblycera

Family Gyropidae (found exclusively on mammals).

Genus Gyropus, 7 species.

Family Liotheidae (found almost exclusively on birds).

Genus Latumcephalum,	1 species.
Genus Heterodoxus,	1 species.
Genus Ancistrona,	2 species.
Genus Nitzschia,	4 species.
Genus Boopia,	5 species.
Genus Trinoton,	10 species.
Genus Laemobothrium,	24 species.
Genus Physostomum,	29 species.
Genus Colpocephalum,	137 species.
Genus Menopon,	212 species.

Sub-order Ischnocera.

Family Trichodectidae (found exclusively on mammals).

Genus Trichodectes, 45 species.

Family Philopteridae (found exclusively on birds).

Genus Eurymetopus,	1 species.
Genus Philoceanus,	1 species.
Genus Bothriometopus,	1 species.
Genus Kelloggia,	1 species.
Genus Ornicholax,	1 species.
Genus Nesiotinus,	1 species.
Genus Giebelia,	1 species.
Genus Ornithobius,	5 species.
Genus Akidoproctus,	6 species.
Genus Oncophorus,	19 species.
Genus Goniocotes,	56 species.
Genus Goniodes,	63 species.
Genus Lipeurus,	181 species.
Genus Docophorus,	214 species.
Genus Nirmus,	229 species.

This really extraordinary disposition of species merits some special attention. In the first place it is of interest to note that exactly the members of the pair of largest genera in each sub-order are the ones most difficult to define satisfactorily. As a matter of fact the genera Menopon and Colpocephalum practically run into each other as do the genera Docophorus and Nirmus. Most of the aberrant monotypic genera, on the other hand, are unusually well distinguished.

It is a matter of note that the species definitions throughout the Mallophaga have to be very plastic. This comes about almost certainly through the fact that the isolation on different host individuals of groups of parasitic individuals is often (cases of nongregarious, solitary hosts for example) considerably in degree, and leads to the restriction of the swamping and evening effects of free inter-crossing. There must be much in-and-in-breeding of successive generations of the parasites on such solitary and monogamous hosts as eagles, for example. (It should be remembered that the Mallophaga are wingless and migrate from host individual to host individual only at times of the actual contact of the host bodies. Mallophaga cannot live off of the host body for more than a few hours or days and as a matter of fact are very rarely [except in hen houses] ever to be found off the host body.)

But while this isolation of groups of individuals of a Mallophagan species tends to foster and fix many slight variations and hence to break down species limits, the general similarity or identity of environment and food, viz., birds' bodies and feathers, tends to restrain any tendency toward large variation, or at least does not tend to encourage any such modification. Bird's feathers are about the same as food and bird's bodies as habitat whatever the species of bird or its habit. Mallophaga on water birds have no aquatic life at all but live against the dry warm skin of the host, surrounded by the air held among the interlacing feathers.

How then have the monotypic aberrant genera come to be developed at all? A problem. And one quite beyond my power to answer. Has there been such persistent and positive determinate variation that despite the monotony of environment these radically different types have come to exist? Or have there been considerable mutations or cases of discontinuous variation resulting in the sudden appearance of fixed new forms of markedly different type from their progenitors?

Thus even from the tedious work of competition and cataloging one may rescue some stray bits of interest. As a matter of fact if we could really understand the why of the generic relations of our twelve hundred odd Mallophaga we should have the key to the master puzzle. And then how stale and profitless would the rest of our cataloging and scrutinizing of species be!

NOTES ON NEW ENGLAND BOMBYLIIDAE, WITH A DESCRIPTION OF A NEW SPECIES OF ANTHRAX.

BY CHARLES W. JOHNSON, BOSTON, MASS.

ANTHRAX SHAWII n. sp.

♂ ♀. Face and front black, with blackish pile and tomentum, that on the face showing in certain lights a whitish reflection, occiput black, with a silvery white tomentum; antennae black. Thorax and abdomen black, front and sides of the thorax, margins of the scutellum, and sides of the abdomen to the base of the third segment, bordered with dark orange red pile; dorsum of the thorax and disc of the scutellum with black tomentum showing a whitish reflection. Abdomen with two broad bands of yellowish white tomentum, the one on the second segment occupying the basal half, while that on the fourth covers the entire segment the last segment is also covered with yellowish tomentum margined with black, a few scattered yellowish scales sometimes present on sixth segment. Legs black, wings hyaline, the costal cells and base, including the alulet dark brown. Length 6 mm.

Five specimens of this interesting little species were collected by Mr. S. Albert Shaw, among the sandhills at Hampton Beach, N. H., August 27, 1906. Types in the New England collection of the Boston Society of Natural History. Paratypes in Mr. Shaw's and the author's collection. Through the kindness of Mr. A. H. Kirkland, I have also seen a specimen from Westport, Mass., Sept., 1907.

The species resembles some of the smaller examples of *A. lateralis* Say, but can be readily separated, by the dark tomentum of the face, the dark orange-red (not yellow) pile and dark costal cells.

ANTHRAX LATERALIS Say.

This variable and widely distributed species has in the Eastern United States two well marked variations which cause considerable confusion when lumped with the typical form. In order to eliminate this confusion provisionally I will briefly define the two forms. The one more commonly observed has the tomentum on the *front black*, on the face it is grayish, but in certain lights *blackish*; anterior margin of the thorax, pleurae and *sides of the first two segments of the abdomen, with yellow pile*; entire dorsum of the thorax, the middle of the first and second segments and all the other segments of the abdomen with black tomentum and pile. In some specimens there is a faint band of yellow tomentum at the base of the fourth segment and more or less prominent tufts of silvery tomentum on the terminal segment.

They vary in length from 7 to 11 mm. This seems to be the only form that can, with any certainty be referred to Macquart's *gracilis* "Face et front à poils noirs. Un peu de fond testacé sur les côtés des deux premiers segments de l'abdomen. Long. 4¼ l. ♀". The varietal name of *gracilis* might therefore be used. Specimens are before me from Cranberry, N. C., June 10, '96 (*H. W. Wenzel*); Westville, N. J., June 15, '94 (*C. W. Johnson*); Lehigh Gap, Pa., July 2, '01 (*H. L. Viereck*) Lake Pleasant, N. Y. (*Dr. E. G. Love*). Woods Hole, Mass., July 24, '03 (*Johnson*) Jaffrey, N. H.; Waterville, Me., July 19, '07 and Hampden, Me., Aug. 16, '07 (*E. F. Hitchings*).

In appearance it seems to hold the same relation to the typical *lateralis* that *hypomelas* holds to *alternata*, although in the latter case *hypomelas* is considered a good species. The group should be carefully studied in connection with some of the western species.

The other is a small form 6 to 7 mm. in length, with white tomentum and pile. The only yellow tomentum is a small triangular patch in front of the scutellum and sometimes scattered scales on the terminal segment of the abdomen. The second, third and fourth segments have prominent basal bands of white tomentum. This form seems to be more numerous in the spring. It was collected at Riverton, N. J., April 30; at Clementon, N. J., numerous specimens were taken from May 16 to 30, flying over the white sand; it was also collected among the sand dunes back of Provincetown, Mass., June 25, 1904. The varietal name of *arenicola* might be applied to this form.

A number of other interesting species of Bombylidae have been added to the New England fauna, including:— *Spogostylum albofasciatum* Macq., Provincetown, Mass., June 25–27, 1904. *Spogostylum pauper* Loew, Provincetown, Mass., June 25; Manomet, Mass., July 17, (*J. A. Cushman*). *Oncodocera leucoprocta* Wied., West Bedford, Mass., June 8, 1906 (*L. W. Swett*). *Phthiria coquilleti* Johnson, Nantucket, Mass., July 4, '06 (*J. A. Cushman*). The latter were slightly smaller than the types collected at Riverton, N. J.

THE ENTOMOLOGICAL SOCIETY OF AMERICA.

The third meeting of the Entomological Society of America was held at the University of Chicago, December 30 and 31, 1907, in affiliation with the American Association for the Advancement of Science, and other societies. About one hundred were in attendance, coming from as widely remote localities as Maine and California, Ottawa and Louisiana.

On Monday sessions were held for the reading of papers, the program of which follows:

Notes on the Geographical Affinities of the Isle Royale, Lake Superior. (An outline of the relations of the Isle Royale fauna (beetle fauna) to that of Northern North America. General remarks on the major faunal centers based on beetles.) Charles C. Adams.

Some problems in Nomenclature. (A brief discussion of the validity of names, particularly those bestowed on insect galls and larvae.) Dr. E. P. Felt.

Stereoscopic Photography Applied to Entomological Subjects. (Exhibition of excellent stereoscopic effects brought about by an ingenious but simple apparatus.) Professor F. L. Washburn.

Life History and Habits of the Dimorph of *Chaitophorus negundinis* Thos. (Previous knowledge of the dimorph. Comparison with a similar dimorph in Europe. Life history; appearance in summer. Part played in the survival of species, etc.) John J. Davis.

Is Mutation a Factor in the Production of Vestigial Wings among Insects? (A summary of some observations among insects belonging to various groups, where the evolution of wingless or subapterous species can be traced within a genus or small group.) Charles T. Brues.

The Sense of Sight in Spiders. Dr. Alexander Petrunkevitch.

External Wing-Buds in Larvae of Holometabolous Insects. (A discussion of the general subject and recorded instances; and a report of an unrecorded instance.) Dr. William A. Riley.

Notes on the Nervous System of the Corydalis Larvae. A. G. Hammar.

Notes on a Chalcid Infesting Apple Seeds. C. R. Crosby.

The Mouthparts and Phylogeny of Siricidae. J. Chester Bradley.

On Certain Structural Characters of the Genus Catocala. W. Beutenmüller.

Is *Vespa borealis* an Inquiline? (An account of finding males and females of *Vespa borealis* living in the nest of *V. diabolica* on several occasions, apparently on perfectly friendly terms.) Dr. James Fletcher.

The Entomological Society of America and Its Work. Henry H. Lyman.

The Habits of the Crane-Fly, *Dicranomyia defuncta* O. S. Dr. James G. Needham.

The Life History of a Bee-Fly (*Spogostylum anale* Say); the Larvae Parasitic on the Larvae of a Tiger Beetle *Cicindela soutellaris* Say. (The eggs are laid in July and August; larvae on the last larval stage of the host in the spring; when the host makes its pupal cell and the internal parts become semi-fluid, the parasite moults and grows very rapidly completely destroying the host. (July.) The pupa digs toward the surface by wriggling movements of the body, and the adult emerges when the surface is reached.) (Title only.) Victor E. Shelford.

Circumfili in the Cecidomyiidae. (A discussion of the morphology and taxonomic value of these organs.) Dr. E. P. Felt.

Ancestral Ephemeridae from the American Permian Formation. (A group of true Ephemeridae obtained from the Permian of Kansas. The earliest known true Ephemerids, and with the exception of a few Russian specimens all that are known from the Permian. They present a distinct early stage in the evolution of the Ephemerid line.) Dr. E. H. Sellards.

Observations on the Life History and Adaptation of a New Semi-Aquatic Aphid. (Habits, life history, and specialization of *Aphis aquaticus, novus,* found on the water thyme; many remarkable adaptations to its semi-aquatic life.) C. F. Jackson.

The New Biological Field Station of Cornell University. Dr. James G. Needham.

Collecting Grounds around Chicago. A. Kwiat.

Habits of the Larvae of Lycaena. J. H. Cook.

On Monday evening the annual address was given before the Society by Professor Herbert Osborn, of the Ohio State University, his subject being "The Habits of Insects as a Factor in Classification." The address was followed by a most enjoyable smoker, at which the members of the Society and their friends were the guests of the Entomological Section of the Chicago Academy of Sciences.

At the Annual Business Meeting on Tuesday, the 31st, the following officers were elected:

President, Dr. William Morton Wheeler,
1st *Vice-President,* Dr. John B. Smith,
2nd *Vice-President,* Rev. Prof. C. J. S. Bethune,
Secretary-Treasurer, J. Chester Bradley.

Additional members of the Executive Committee:— Dr. James G. Needham, Prof. V. S. Kellogg, Prof. Herbert Osborn, Prof. J. H. Comstock, Dr. P. P. Calvert, Mr. F. M. Webster.

Standing Committee on Nomenclature.

To serve 3 years, Dr. H. T. Fernald,
To serve 2 years, Prof. T. D. A. Cockerell,
To serve 1 year, Dr. E. P. Felt.

Committee on Nomenclature:— Dr. Fernald moved, seconded by Dr. Smith,

1. That the Entomological Society of America hereby endorses the Code of Nomenclature adopted by the International Zoological Congress as the code which should be used by the members of the Society so far as it can be applied.

2. That cases not covered by this code which may be presented to the Society for consideration, be referred to a standing Committee on Nomenclature, to consist of three members, one member of which shall be elected each year for a term of three years, and the opinion of this Committee on cases referred to them, shall be reported to the Society at the first annual meeting subsequent to their reference to the Committee.

Mr. Bradley moved to amend by striking out the second clause, because entomology should not be treated as distinct from zoology in general, and because the Commission on Nomenclature established by the International Congress of Zoology is the sufficient and proper body before which to bring such question for decision.

Dr. Fernald stated that the reports of the Commission on Nomenclature of the International Congress of Zoology are greatly delayed by the fact that the Congress meets only once in three years, and by the rule that a question must be presented at least a year before the meeting at which it is to be considered. It was not the intention of the mover that the Committee should act in opposition to or independently from the Commission on Nomenclature, but that it should be instrumental in voicing the needs of entomology before that body, which should be the final court of reference.

With that explanation, the amendment was withdrawn and motion passed.

Publication of a Journal:—

Perhaps the most important act of the meeting was embodied in the following resolutions adopted by the Executive Committee and confirmed by the Society:—

1. That the Society undertake a publication to be called "Annals of the Entomological Society of America," to be issued in quarterly fascicles.

2. That it include only papers of importance or marked merit, and that each be issued and bound separately as well as in fascicles so that each paper may be sold separately.

3. That proceedings of the meetings be included either at the beginning or end of each volume and form one separate, which is to be sent to all members of the society.

4. That a subscription price of One Dollar in addition to the membership fee be charged members for the annals and that the subscription price to non-members, libraries, etc., be $3.00.

5. That an Editorial Board be selected by the Executive Committee and that this Board shall select one of its members as managing editor, who, with his associates, shall be responsible for the selection of material to be published.

6. That if possible someone living in a suitable location and who can undertake the work of managing editor for a series of years, be selected for this position.

7. That details not covered in this report are to be determined by the Editorial Board.

8. That actual publication under the provisions of this report be inaugurated as soon as possible.

It will be seen from the above that all members will receive the number containing the full proceedings of the meetings free, and upon payment of one dollar the entire annals; while the regular subscription price to non-members will be $3.00.

A resolution was passed limiting the number of Fellows for the present to 10% of the membership.

The meeting then adjourned, to meet next December in Baltimore.

During the sessions the Executive Committee selected the following Fellows: Justus Watson Folsom, William Joseph Holland, Clarence Preston Gillette, Lawrence Bruner, Mark Vernon Slingerland, Henry Clinton Fall, Charles Lester Marlatt.

The following were elected members: G. E. Sanders, Urbana, Ill.; G. D. Shafer, Ithaca, N. Y.; Dr. J. A. Nelson, Ithaca, N. Y.; A. G. Hammar, Ithaca, N. Y.; William H. Blatchley, Indianapolis, Ind.; A. B. Wolcott, Chicago, Ill.; E. S. Worsham, Atlanta, Ga.; R. W. Harned, Ag. College, Miss.; Dr. Alex. Petrunkevitch, Short Hills, N. J.; Prof. T. D. A. Cockerell, Boulder, Colo.; Wilmon Newell, Baton Rouge, La.; J. C. Hambleton, Columbus, Ohio; G. Ainslee, South Anthony Park, Minn.; L. H. Weld, Evanston, Ill.; Prof. B. H. Guilbeau, Baton Rouge, La.; J. Zetek, Urbana, Ill.; Prof. S. W. Williston, Chicago, Ill.; Mr. C. F. Curtis Riley, Mankato, Minn.; Dr. J. F. Abbott, St. Louis, Minn.; Mr. W. S. Fisher, Harrisburg, Pa.

During the sessions an exhibit of entomological specimens and materials was open for the inspection of those interested. The titles of the exhibit are given below:

Some Enlarged Photographs of Fossil Insects. Charles T. Brues.

New Devices in Economic Entomology. W. E. Hinds.

Stereoscopic Pictures of Insects. Professor F. L. Washburn.

Dimorph of *Chaitophora negundinis* Thos. John J. Davis.

Case of Fall Webworm Moths (*Hyphantria textor* and *H. cunea*) Showing Range of Variation of the Latter; Inflated Larvae. Henry H. Lyman.

Entomological Specimens and Equipment; Interesting Insects from Mexico, Cuba, and Indo-Australia; New Species of Dynastes, etc. Dr. G. Lagai.

Stereoscopic Photographs of Oryssidae Taken with the Camera Attachment to the Zeiss Greenough Binocular Microscope. Mouth parts of Siricidae. J. Chester Bradley.

Stereoscopic Photograph of a Tenebrenoid Beetle Taken with an Ordinary Camera Using an Eccentric Diaphragm. C. R. Crosby and J. C. Bradley.

J. C. BRADLEY,
Secretary-Treasurer.

OBSERVATIONS ON THE BREEDING HABITS OF THREE CHRYSOMELID BEETLES, *CALLIGRAPHA BIGSBYANA*, *C. MULTIPUNCTATA* AND *C. LUNATA*.

BY ROBERT W. HEGNER, MADISON, WISCONSIN.

During the summers of 1905–07 I was engaged in the hybridization of a number of chrysomelid beetles, chiefly three species of the genus Calligrapha, namely *C. multipunctata*, *C. bigsbyana* and *C. lunata*. My experiments are not yet completed but some points of interest have developed in regard to the breeding habits of these species while kept in the laboratory under artificial conditions.

The geographical distribution of the Calligraphas cannot be given accurately because of the fragmentary condition of the data concerning their occurrence. They have been reported from eighteen states situated in boreal America and no doubt may be found in favorable localities anywhere in this region.

The willow is the principal food plant of *C. bigsbyana* and *C. multipunctata*; all authors who have made observations on the subject include this plant, and all specimens that have been collected for me or by me were found on its leaves. The beetles prefer the long-leafed species, *Salix longifolia,* and, as far as I know, do not occur in nature on any other form. They will live however on other willows if forced to do so as adults and larvae will eat *Salix amygdaloides* in the laboratory. Hamilton ('95) gives Alnus and Acer as the food plant of *C. bigsbyana* in southwestern Pennsylvania as does Smith ('99) also for New Jersey.

C. lunata has been found only on the wild rose, Beutenmuller ('90), Lugger ('99) and others having reported its capture on this plant.

There are four methods that may be mentioned of keeping these beetles in the laboratory — all of which have been used. First, the glass tank made in such a way as to allow the experimenter to subject the insects to various degrees of moisture, temperature, etc; second, the plaster of paris cage used by Janet ('93) for breeding ants and later by Dimmock and Knab ('04) for raising carabid beetles; third, the ordinary wire cage; and fourth, glass covered slender dishes. The last named was found to be the easiest to manage. The dishes should be about 10 cm. in diameter, if larger the food tends to become dry.

One or more pairs of beetles may be kept in a single dish. A few fresh leaves of willow or rose were placed in each dish every morning and the partly eaten leaves of the previous day removed.

Eggs were collected at various times, usually in the morning unless the exact time of laying was desired when the dishes were examined every hour throughout the day. They are laid in batches on the side of the leaf which is beneath. The part of the leaf to which the eggs were attached was cut out and placed in a watch glass. A water soaked piece of filter paper was included to prevent desiccation. If kept too moist a fungus, one of the mucors, attacks the eggs. The eggs remained in the watch glass until they hatched.

The larvae were placed in small dishes and fresh food was given them every day as in the case of the adults. When the larvae were nearly ready for pupation they were transferred to dishes containing an inch of sandy loam. They burrowed into this and formed a spherical chamber in which they lay on their backs while their last larval skin was shed and during the pupal period. The imagos escaped to the surface immediately after being freed from their pupal covering and before their color pattern had made its appearance.

Egg-laying in *C. multipunctata* will answer for that of the three species under consideration as there was no appreciable variation in time, number, or method. A number of beetles were examined while laying, the process being as follows. The beetle selects a leaf and clings to its under surface. The tip of the abdomen moves rhythmically up and down about fifteen times at intervals of a little less than one second. This results in the exudation of a drop of viscid colorless fluid about one third the transverse diameter of the egg. The egg is forced out a moment later and carries with it this drop of fluid by means of which it is fastened to the leaf. When the egg reaches the leaf it is pushed back away from the beetle which then moves to one side and begins the rhythmical movements which precede the laying of another egg. In this way eggs are laid in a double row as shown in the accompanying figure, but frequently three or more may be laid in one row. The intervals between the layings of the individual eggs average one minute and twenty seconds.

Fifty-four pairs of beetles were examined daily during the laying period and a record made of the number of eggs laid. One pair produced fourteen eggs on June fifteenth and a batch was laid every day with the exception of several longer intervals until August twenty-seventh. Two to nineteen were laid at one time, the largest number for any one day being twenty-nine and the average number per batch, eight. The total number laid by this pair was three hundred and seventy-six in seventy-four days. Other pairs produced eggs as follows: 281 between June 22 and Aug. 3, 38 days; 287 between June 22 and Aug. 1, 41 days; 352 between June 11 and Aug. 31, 82 days; 234 between June 25 and Aug. 3, 40 days. This is sufficient to show the quantity of eggs laid by a single female during its life, the average of 54 records being 315.

There is no definite number of hours constituting the hatching period as the time varies from 4 to 7 days according to conditions of temperature and moisture. The average for many batches was 5⅔ days. All the eggs of one batch are in approximately the same stage of development and the larvae grow up together, all pupating at about the same time. Larval life ranges from 17 to 24 days, 20 days being the average. Food conditions are no doubt responsible for the rapid growth of some larvae and the slow growth of others. The pupal period is usually 12 days although many emerge in 11 days and a few linger on to 13 or 14 days. The entire period then from the laying of the egg to the emergence of the imago is 38 days although a few covered this period in 35 days and others occupied 40 days.

The sexes of the imago are distinguishable because of the larger size of the female. A number of beetles were allowed to select their own mates; others were artificially paired. Copulation occurred from 6 to 10 days after emergence and the first eggs were laid 10 to 16 days later making the entire cycle a period of 64 days.

The eggs are differently colored and of different sizes in the three species studied. Those of *C. bigsbyana* are the smallest and are straw colored; those of *C. multipunctata* are slightly larger and are light orange in color; while the eggs of *C. lunata* are white and are larger than either of the other two. The figure gives a good idea of the comparative sizes. As may be expected, the newly hatched larvae have a ground color similar to the color of the egg being straw colored, light orange, and white according to the species.

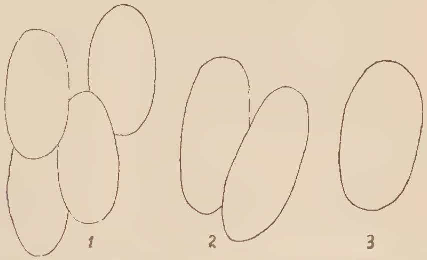

Fig. 1. Eggs of *C. bigsbyana*. Fig. 2. Eggs of *C. multipunctata*. Fig. 3. Egg of *C. lunata*.

Pedigreed material raised in the laboratory was experimented with in an effort to learn the results of hybridizing different species. Pure specimens of *C. bigsbyana* and *C. multipunctata* crossed freely, their eggs being always fertile. The eggs and larvae produced by these crosses were of course in size and color like those of the female parent. No differences were noted in the size or coloration of the hybrids until emergence when the resultant beetles were always intermediate between the two parents. Specimens similar to these intermediate forms are frequently found i nature, a fact that points towards a widespread crossing of these beetles, the foo plant, breeding range, and period of growth being identical for the two species. Th ontogeny of the color pattern is similar to that recorded by Miss McCracken ('06) fo *Lina lipponica*, i. e., it is the same for both species up to a certain point where th color of *C. multipunctata* ceases and retains a rufous tint, while that of *C. bigsbyan* proceeds until the rufous is covered by a layer of darker green pigment.

C. lunata is more difficult to cross with the other two species and only one suc case was brought about. A female *C. lunata* was crossed with a male *C. multipunctat* Both beetles were raised in the laboratory and had not been contaminated befor they were put together. They were often found in copulation and two batches o eggs were laid. The first batch did not hatch although the full grown embryo could easily be seen through the chorion. The eggs of the second batch were preserved at the age of five days for microscopical examination.

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1894.— Hamilton, J. "Cat. of Coleoptera Common to North America, etc. Trans. Amer. Ent. Soc., Vol. 21, pp. 345–416.

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1906.— McCracken, I. "Inheritance of Dichromatism in Lina lapponica." Jou Exp. Zool., Vol. 2, pp. 119–136.

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Professor V. L. Kellogg, of Stanford University, will be in Europe fro April to December of this year. His address is, care French, Lemon & Co., Flo ence, Italy.

TETTIGIDEAN NOTES, AND A NEW SPECIES.

BY A. P. MORSE, WELLESLEY, MASS.

Among some Tettiginae recently received for study from Mr. Wm. T. Davis I find a male and female of *Tettigidea acuta* Morse taken on Staten Id. in April. These are the first examples I have seen since the preparation of the original description which was based on specimens in the Scudder collection taken by or secured from Uhler and labeled simply "N. Y." This material contains also two females of *Tettigidea lateralis* from the same locality, one macropterous, Mar. 2, one micropterous, Oct. 23.

The most interesting part of the collection, however, is a series of 15 specimens of an undescribed form or species of this genus, related to *armata* Morse, collected at Perth Amboy, N. J., May 31; Jamesburg, N. J., Aug. 31; and Staten Id., N. Y., in April, June, and August. All are brachypterous, the pronotum nearly reaching or slightly passing the hind knees. This form is distinguished from *armata*, which it most resembles, by the customary lack of a cuspidate point on the front margin of the pronotum, which is for the most part simply obtuse-angulate with the sides straight, slightly sinuate, or shallowly excavate, occasionally showing variations toward a cuspidate condition. The tegmina are relatively short, bluntly rounded or truncate at apex, with the usual white spot exceptionally large, triangular, sometimes covering nearly two-thirds of the exposed distal half of the tegmina. In size, sculpture of surface of pronotum, and form of vertex it is apparently not distinguishable from *armata*.

I take pleasure in naming this species *Tettigidea davisi* for its discoverer, in deference to his studies on the orthoptera of the vicinity of New York.

A Note on the Distribution of Bittacomorpha jonesi.— Since describing this species (Psyche, XII, p. 75, 1905) from Mt. Taxoway, N. C., I have collected four specimens, June 18, 1906, along the foot of the Hoosac Mt. at Briggsville, two miles northeast of North Adams, Mass., and one specimen near St. Johnsbury, Vt., June 27, 1906, along a branch of the Passumpsic River. Recently Mr. H. S. Harbeck informs me that he has collected a specimen at Clementon, N. J.

C. W. Johnson.

NOTES ON ATTELABUS RHOIS AND PARASITE.

BY C. A. FROST, SOUTH FRAMINGHAM, MASS.

During July, 1904, while collecting Coleoptera along the edge of a large tract of alders (*Alnus incana*) that covers a rocky hillside in the town of Wales, Maine, I found this beetle occurring in great abundance. As many as a dozen of their rolls or nests in various stages of freshness could be counted on a single small cluster of bushes while the ground was littered with the dried, brown cylinders that had fallen. This was on the 15th of the month and five miles away at Monmouth I was unable to find a single specimen. On the 20th of June of the following year a few nests were found at Wales and on the 30th they were quite plentiful in a few places at Monmouth. While I have taken only two or three specimens of the adult weevil in Massachusetts during the last five years, similar nests, each containing a similar egg, have been found in numbers at Framingham, Mass., on the hazel (*Corylus americana*).

In Maine the adult insect feeds upon the alder leaves, eating long narrow holes between the veins in a manner that gives the leaves a very peculiar and distinctive appearance. Most of the small cross veinlets are eaten off leaving the ends sticking into the hole and giving it a ragged or notched outline, while here and there a veinlet is left untouched.

Dr. A. S. Packard, in 1872, published an article entitled Embryological Studies on Hexapodous Insects, III Memoir Peabody Academy of Science, in which he gives a few observations on the habits of this species of Attelabus. Therefore, while the following notes on the construction of the egg roll, or nidus, are not entirely new, there may be a few more points worthy of consideration.

The work of preparing and rolling the nidus, so far as shown by my observations, is done entirely by the female weevil. She selects a leaf and cuts a slit on each side of the petiole, extending from the blade to the mid-rib at a short distance from the base of the leaf. This cutting leaves a triangular piece of the blade attached to the petiole while the major part of the leaf is held only by the mid-vein at the point where the cuts converge. This point is next attacked. The front legs are thrust down through the two cross cuts and clasped around the mid-vein, while the hind legs are spread far apart and extended out on the blade of the leaf. Then pushing downward with the hind feet and pulling upward with the front legs, she bites the mid-vein until it droops and hangs at right angles to the stem. The operation is not always done in this way, however, for one female was observed standing on the petiole while at work, and, not using the legs at all, relying upon the weight of the leaf to bring it down when sufficiently cut through. One female was timed while cutting the mid-vein; she completed the work in four minutes.

As soon as the leaf falls into a pendent position, the weevil begins travelling over the upper (in every case observed) surface, biting it at every step and at the same time drawing it into a wrinkle by the two sharp spurs at the tarsal ends of the anterior tibiae. The path over the leaf was in many cases parallel to the edge but became very irregular after two or three rounds had been made. Leaves examined at this stage show, on holding to the light, the course of the weevil by a series of small holes. The time required by one female to finish the upper side was about fifteen minutes of continuous work.

In every case observed the mid-vein was the first point to be attacked on the under side of the leaf; and the cross-veins showed by the brown spots plainly visible on the more wilted leaves that the biting was done mostly on them. This may be on account of the thick pubescence on the under side of the alder leaf being shorter and less troublesome on the veins. They may be bitten their whole length or only a short way from the mid-vein.

As soon as the under side is completed, which does not take as long as the upper side, copulation often takes place, although cases were noticed when this occurred while the preparation of the upper side of the leaf was in progress. Dr. Packard states in the article previously referred to, "I once saw a female pick up a leaf with her jaws, then stop, and run back to receive the embraces of the male, and then resume her work. In another case I saw the sexes unite after a roll had been half made, so that it is probable that union occurs several times at short intervals, as I have observed to be the case with *G. polygoni*." When the male appears on the leaf he takes a position on the petiole, or sometimes, as Dr. Packard mentions, on an adjoining one. If alarmed, he sits nearly upright with the head and snout raised as if scenting an enemy and remains motionless for a long time. The least jar of the bush, unless the wind be blowing strongly, or a quick movement on the part of the observer, should he be too near, will often cause the male to drop to the ground from this apprehensive attitude. The female is not so easily disturbed and observations were frequently made with a hand lens of about an inch focus without attracting her attention. A slight jar would generally cause her to suspend operations for a moment or so, but there would be very little fear exhibited. In one instance the male was observed to run down the leaf, around the female, and back again as if inspecting her work; and after she began to roll the leaf he became very excited and kept moving continually.

After the biting is completed, the female, sitting upright, oviposits on the tip of the leaf. In nearly every nest examined the egg was placed on the under or pubescent side but the tip had been bent back against the smooth surface and the egg had become the very center of the roll. Out of the dozens of nests opened only one was found to have two eggs, all the rest contained but a single, yellow, translucent egg. Dr. Packard states, "Before the leaf is entirely rolled, she deposits a single egg, rarely two, in the middle, next the mid rib, in a little cavity, where it lies loose." He also describes the egg as being nearly spherical, though a little longer than thick, .04 of an inch long, by .03 of an inch in diameter.

The leaf, by the time oviposition has been completed, has become very much wrinkled and wilted so as to be easily manipulated in any way. It may be the object of the biting process to accomplish this result more quickly by weakening the leaf by cutting so many small fibres and causing the sap to evaporate more rapidly.

The female with her snout and fore legs now crumples up the tip of the leaf with the egg in the center for the beginning of the roll, at the same time folding the leaf so as to bring the two smooth halves together. It is then rolled up with the mid-vein as one edge of the roll and the doubled serrated edge as the other. The rolling is done by the tibial spurs and the jaws which are much stouter and thicker than those of the male. When the serrated edge of the roll becomes twisted at times like the top of a paper bag, the snout and jaws are thrust into the end of the roll until the head is out of sight, and the protruding edges are tucked carefully within while the legs are used to pull the edges of the roll together and hold them for several seconds in this position. One weevil was timed from the commencement of the biting and wrinkling process until she stood on the completed roll taking a rest; it was almost exactly one hour. This seemed a shorter time than usual which may be accounted for by the fact that there had been no interruptions.

During my observations in 1904, at Wales, while the leaf was being wrinkled, there appeared from two to six small, green-bodied hymenoptera with conical abdomens on each leaf. They either followed the female weevil at a short distance or remained at rest on different parts of the leaf. The male weevil would, apparently, make efforts to drive them away, once even pushing one from the leaf with his snout, but no attempt to bite them was observed. A leaf was picked on which a weevil had just oviposited and on which were four of these hymenoptera; while held in the hand two of them evidently oviposited and immediately left. No egg could be seen.

At Monmouth in 1905, not more than one of these parasites could be found attending a weevil, and then only after the rolling process had been started. The insect ran about or rested on the upper part of the leaf. When ovipositing, it generally selected a place on the side of the roll that was about to be covered by the next fold;

rising to the full length of its legs, it would then be able to insert the end of its ovipositor, and it was thrust down into the roll sometimes by twisting and turning the body as if the entrance was rather difficult. When the ovipositor was in full length, the center of the body was touching the leaf and the tip of the abdomen pointing up into the air, making nearly a right angle with the head and thorax. This operation occupied only a second or two, and one parasite was seen to oviposit, or, at least, to thrust the ovipositor down into the same roll sixteen times during the formation of the nest. The female weevil did not notice the parasite even when it was within a quarter of an inch of her. The male weevil was patrolling the roll while the parasite was ovipositing and only once did he seem to interfere with its work. A sudden shower stopped these observations and another favorable opportunity did not occur.

Specimens of the weevil and parasite were sent to Washington where Dr. Chittenden identified the weevil as *Attelabus rhois*, Boheman, and Dr. Ashmead pronounced the parasite to be *Omphale* (*Euderus*) *elongatus*, Ashmead. It had not been recorded before as an enemy of the weevil.

A number of alder rolls were brought from Maine in 1904 and opened at different dates. The following notes were made:

On July 30th one was found to contain a yellowish, shrunken larva, bent at right angles in the middle, and apparently just alive. There was also found in this roll a smaller white larva, slim and straight, about 1 mm. in length. A large yellow larva in plump condition was found in another roll and no parasite. This larva was 2.5 mm. long and covered with whitish hairs which were longer and pointing forward on the thoracic segments. The head and jaws were of a chestnut color. It was flattened beneath and seemed incapable of straightening itself from its curled-up position.

On September 4th I opened all the remaining alder rolls and found the inmates dead probably from mould. In one nest were three small larvae, apparently Hymenopterous.

The investigations of the habits of this weevil has brought out the peculiar fact that while the weevil feeds and makes its nest upon the alder (*Alnus incana*) in Maine, in Massachusetts, as far as I have yet been able to discover, it makes its rolls from the leaves of the hazel (*Corylus americana*). I found one instance where it had fed on the leaves of this species of hazel in Maine, but the bush was growing beside an infested alder and the branches were intermingled. I have never taken the adult weevil on the hazel in Massachusetts, in fact, during the past seven years I have taken but two specimens in this state.

On August 6th, 1904, I secured a dozen or more nests from the hazel in Framingham. Of the two examined at this time, one contained a very small larva and the other was empty. One of the alder rolls from Maine was opened at the same time and found to contain a much larger larva. On September 4th three of the hazel rolls were opened and several small, yellowish white, footless larvae were found between the folds of the roll, and a larger larva in the center of the roll. These small larvae were about 1 mm. in length. There were several of the rolls that were fastened together by a web at this time and an examination showed that a dark, smooth, Lepidopterous larva had been feeding on the rolls and leaving a mere shell with a hole in the side. The rolls were also covered with small white mites. On February 4th two hazel rolls were opened and one larva about 6 mm. long was found in each. They were similar to the one found in the alder roll on July 30th, but larger. The inside of the roll was filled with fine dust leaving only two or three of the outside folds intact.

A large number of alder and hazel rolls were collected in 1905 and kept until the next summer when, in June, nearly every alder roll yielded an adult weevil and six or more were obtained from the hazel rolls. The latter were, however, not fully developed, perhaps on account of being kept too dry. Not being able to detect any marked difference between the alder and the hazel specimens, I sent several of each to Mr. Frederick Blanchard who very kindly examined them and wrote me that he was unable to discover any difference between them, but on account of the condition of the specimens he could hardly consider this as being conclusive.

Assuming that there is only one species, I am unable to offer any explanation why the food plant should differ in the two localities. It cannot be attributed to the abundance of one species of plant in one locality and its scarcity in the other because at Monmouth, Maine, the two species of shrubs grow side by side; at Wales, Maine, I do not remember seeing any hazel, certainly not in the immediate vicinity of the infested alders; at Framington, Mass., in one locality the alder is the more abundant and in another place the hazel patch is isolated.

Besides the article by Dr. Packard, previously referred to, the following papers on the habits of the species of the Attelabidae have been brought to my attention by Mr. Blanchard: Notes on Attelabus Bipustulatus by Miss Mary Murtfeldt, Can. Ent. v. IV, 1872, p. 143. Attelabus Bipustulatus, Fab. Theory of Oviposition and Construction of Nidus; Miscellaneous Notes by A. Arsene Girault, Ent. News, v. XV, pp. 189–193. A brief mention of *Attelabus rhois* on the hazel in the Can. Ent. v. XXIII, pp. 21 and 26. Cambridge Natural History of Insects, pt. II, p. 29, gives an account of the operations of *Rhynchites betulae,* an European leaf roller, and refers to more extensive remarks by German writers.

SEXUAL CHARACTERS.

Male.— Apical angles of the beak prolonged, acute; beak longer before the eyes and slenderer than in the female causing the eyes to appear slightly more prominent. By careful comparison the antennae will be found to be stouter, with the club larger and the joints more loosely articulated than in the female. Head narrower behind the eyes than the female, with a prominent median carina extending from the posterior line of the eyes to the occiput, carina often black and sometimes with a black area surrounding it. Prothorax more narrowed in front than in the female. Anterior tibiae arcuately curved, slender, equal in length to one and one half times the length of the prothorax; all the tibiae are armed at the distal end with a single curved hook, the inner or posterior one wanting; all tibiae with two rows of serrations on the inner edge. The anterior femora, viewed laterally, are straight on the upper edge — that is, the clavate portion is asymmetrical; the femora are longer and the coxae longer and stronger than in the female. The prosternum is not so deeply excavate (or emarginate) in front, and with an evident depression before the coxae.

Female.— Apical angles of the beak only very rarely prolonged; beak shorter and stouter, broader and thicker at the apex than in the male. Head with the carina usually replaced by a smooth median line, sometimes with a black area as in the male. Prothorax broader in front. Anterior tibiae equal to or slightly exceeding the length of the prothorax; the inner row of serrations on the inner edge of the tibiae are more prominent than in the male; first serration sometimes half the length of the inner hook of the tibia. In the females all the tibiae are armed at the distal ends with two hooks curving inward toward the body, the outer one of which is longer and stouter. All the femora are symmetrically clavate. Prosternum emarginate or excavated in front nearly to the coxae.

I am indebted to Mr. Frederick Blanchard for pointing out the characters of the prosternum, and antennae, and for informing me that the serrations of the tibiae are disposed in two rows. He has also very kindly verified the other characters from specimens in his cabinet.

My few specimens of *Attelabus analis* and *bipustulatus* agree with *rhois* in the sexual difference of the tibial hooks, and Mr. Blanchard writes me that his specimens of *analis, nigripes,* and *bipustulatus* all differ in the same manner sexually. He also says regarding the two last mentioned species, "It seems not to have been noticed that in *Attelabus nigripes* and *bipustulatus* the beak is obliquely truncate beneath and that the gular peduncle is obliquely compressed each side, converging to a distinct angle which is still more marked and almost dentiform, when viewed laterally. This is most distinct in the females of *bipustulatus*."

I have none of the former species, but my few females of the latter show very clearly the above characters as he describes them.

In connection with this subject, attention is called to an error in the Rhynchophoridae of America North of Mexico, LeConte and Horn, p. 10; under *Attelabus analis* the sex marks should be reversed in the description of the sexual characters. Also in the Family characters on the same page the statement "armed at the tip with two strong hooks" is misleading and should be qualified, because this, as it now reads, applies only to the females and not to the males which have only one hook. This latter statement appears also in the "Classification" and should be restricted likewise.

THE HALICTIDAE OF SOUTHERN MAINE.

BY JOHN H. LOVELL, WALDOBORO, MAINE.

WHILE comparatively few new species of bees have been found in southern Maine, the described species very frequently differ in a greater or less degree from southern and western material. This is especially true of the species of Halictus, which present variations in the descriptive characters in consequence of which it is difficult in many instances to determine whether they are of varietal or specific importance. H. provancheri D. T. exhibits only slight differences, but the female of H. lerouxii Lep. is narrower than the Illinois representative of this species, and has the pubescence of the thorax above ochreous instead of grayish-white. H. craterus is a new species allied to H. similis and H. discus. H. arcuatus var. parisus, especially the male, differs so widely from typical material that it might well be regarded as a new species. The local specimens of H. foxii closely resemble the Illinois form and at most constitute only a race; while H. divergens sustains a nearly similar relation to H. quadrimaculatus. Maine specimens of H. pilosus are usually smaller than those from Indiana; while H. pilosus var. leucocomus occupies an intermediate position between this species and H. pruinosus, and is usually mistaken for the latter species. H. hortensis is near to H. sparsus, but it may be separated from specimens of the latter species received from Pennsylvania by its larger size, and in the female by the broader and lighter-colored abdomen, and in the male by the more coarsely striated disc of the metathorax. Opportunity for more extensive comparison would doubtless reveal numerous differences in other species.

Only the females of Halictus fly in spring, while the males are found in midsummer and autumn. In the flower records given in this paper an endeavor has been made to give the earliest and latest dates upon which each sex has been captured. The females have been taken from April 30th to Sept. 6th; during the early part of the season they are common on the flowers of the willows, plums and blackberries and later on Rosa humilis, Aralia hispida, Rhus typhina and other plants. The males have been collected from July 19th to Sept. 12th (garden marigold), but chiefly during the month of August. There is no better collecting ground for this sex than the various species of golden-rod, and on a single inflorescence on Sept. 8th I collected nearly a dozen specimens. The males, however, of H. arcuatus var. parisus have been taken almost exclusively on the flowers of the thoroughwort, or Eupatorium perfoliatum, one only having been found on Solidago. Late in the season numerous specimens of Halictus may be taken on the fall dandelion, or Leontodon autumnalis; thus I find in my notes a record that twenty-four specimens, mostly of species of Halictus, were collected on this plant on Sept. 6th. The females of H. lerouxii and H. craterus are very common, and the males are nearly equally abundant, in which respect they differ from the males of all other species of Halictus found in this locality. All of the species appear to be polytropic except H. nelumbonis, which at Waldoboro has been observed only on Nuphar advena. In some instances where only one or two flower-records have been given this is due to the rarity of the species or to an insufficient number of observations. The collecting season in this locality closes for all genera except Apis and Bombus by the middle of September.

Specimens of many of the species enumerated in this paper have been kindly examined by Prof. T. D. A. Cockerell who has compared them with authentic material, and furnished valuable notes and suggestions.

HALICTUS.

(Halictus sens. str.)

Halictus provancheri D. T.

1882 Halictus constrictus Prov. (not Sm.), ♂, Nat. Can. 13: 202.
1888 Halictus constrictus Prov. ♀ ♂, Add. faun. Can. Hym. p. 316.
1895 Halictus fasciatus Robt. (not Nyl.), Trans. Am. Ent. Soc. 22: 117.
1896 Halictus provancheri D. T. Cat. Hym. 10: 77.

H. fasciatus Nyl. is a European species and probably does not occur in America. According to Mr. J. C. Crawford "H. fasciatus" Robt. is the species described by Provancher as H. constrictus. This is also doubtless the bee recently described by Vachal as H. nearcticus.

The female has been taken on Salix Bebbiana, May 13; Ogon plum (to which it is a common visitor), May 29; Eupatorium perfoliatum, Aug. 24; and Leontodon autumnalis, Sept. 6; the male on Aralia hispida, July 27–30; and Solidago, Aug. 17. A common and widely distributed species, easily recognized by the dull greenish color, and the length of the third submarginal cell equalling twice that of the second submarginal.

Halictus lerouxii Lep.

1841 Halictus lerouxii Lep. ♀, Hist. nat. Insect. Hym. 2:272.
1898 Halictus lerouxii Robt. ♂, Trans. Ac. Sci. St. Louis, 8:44.

The female specimens were collected on Salix discolor, Apr. 30; S. Bebbiana, May 13; garden plum, May 28; Carduus arvensis, Aug. 7; Leontodon autumnalis, Aug. 8; and many other plants; the male on Aralia hispida, July 19; and Solidago juncea, Aug. 4–11. A very common species. The females may often be seen on the flowers of Lonicera Tatarica, collecting pollen, for their proboscides are not long enough to reach the nectar, which is eagerly sought by bumblebees. This is our largest species of Halictus, the females more closely resemble in the color of the pubescence the forms from Colorado and Washington than those of Illinois. H. parallelus Say and H. armaticeps Cr. do not occur here.

(Lasioglossum).

Halictus coriaceus Sm.

1853 Halictus coriaceus Sm. ♀, Cat. Hym. Brit. Mus. 1:70.
1853 Halictus subquadratus Sm. ♂, Cat. Hym. Brit. Mus. 1:72.

This species is much less common than H. lerouxii; in most specimens of the female there are white basal fasciae on abdominal segments 2–3, but not infrequently segment 4 is also fasciate. Female taken on flowers of Salix Bebbiana, May 12; garden blackberry, June 19; Carduus arvensis, Aug. 7; male on Carduus arvensis, Aug. 7; and garden marigold, Sept. 12.

(Evylaeus).

Halictus craterus n. sp.

1905 Halictus similis Lovell, ♀ ♂, Can. Ent. 37: 299.

♀.— Length 9–10 mm.; a broad, robust bee, entirely black, front and mesothorax subopaque, abdomen shining. Face much longer than broad, the sides nearly parallel; clothed with thin, pale yellowish pubescence; with close, shallow, often indistinct, punctures; clypeus produced, coarsely and sparsely punctured, with an apical fringe of reddish-yellow hair; the labrum is broad, with a central tubercle or prominence, the apex produced into a stout tooth fringed with stiff, fulvous hair; antennae black, the flagellum faintly brownish. Mesothorax closely but very distinctly punctured, the punctures large; the dorsum and pleurae clothed with pale ochraceous hair; metathorax sharply truncate, the area not well-defined, shining, with coarse longitudinal ridges. Wings hyaline, reddened, nervures and stigma dark ferruginous, 3rd submarginal cell larger than the 2nd, but about equal on the marginal nervure; tegulae rufo-piceous or nearly black. Legs black, joints 1–4 of the posterior legs with bright orange fulvous hair on the inner side, the hind spur pale yellow, serrate, with about eight short teeth. Abdomen shining, strongly convex; segment 1 is distinctly but sparsely punctured, segments 2–3 are finely punctured all over; segments 2–3 with white basal fasciae often interrupted on 2, segment 3 is also rarely fasciate; apical fimbria reddish-brown.

♂.— Length 9 mm., narrower and more slender than the female. Face densely clothed with nearly white or pale buff-colored hair; clypeus with a transverse pale yellow mark; antennae long, joint 4 longer than 2 plus 3, black, the flagellum brownish. Pubescence of the mesothorax thinner and lighter colored than in the female, the punctuation similar. Abdominal segments 1–2, sometimes 3, with white basal fasciae interrupted in the middle; otherwise closely resembles the female.

Female specimens taken on Salix Bebbiana, May 13; Iris versicolor, June 24 to July 5; Eupatorium perfoliatum, Aug. 24; Leontodon autumnalis, Sept. 6; males on Aralia hispida, July 30; Carduus arvensis, Aug. 7; and Leontodon autumnalis, Sept. 6. A very common species easily separated from all other Maine bees belonging to this genus. It is closely related to H. discus Sm., but discus has the mesothorax smooth and shining, with the punctures widely scattered; the pubescence of the legs is silvery tinged with yellow; and abdominal segments 2-4 are fasciate. H. similis Sm. was described from Hudson's Bay. It differs from H. craterus in the finely punctuated mesothorax, the sparsely pubescent pleurae, the pale testaceous nervures, the testaceous apical margins of the abdominal segments, and the light fulvous apical fimbria. From H. truncatus Robt. the Maine species may be separated by the 1st abdominal segment being punctured all over, and by the serrate hind spur.

H. arcuatus Robt. var. parisus n. var.

According to Mr. J. C. Crawford the female differs from typical arcuatus in the weaker striae of the metathorax and the less distinct punctures on the 1st abdominal segment; the male in having the whitish mark on the clypeus shorter and less distinct, and the apical joints of the tarsi reddish,— in H. arcuatus they are all nearly white. Compared with specimens of both sexes of H. arcuatus received from Mr. Crawford, the males of the Maine variety are larger, with the apical margins of the abdominal segments black instead of pale testaceous, and the mandibles are also darker; the females are very similar to those of arcuatus, but the apical margins of the abdominal segments are less testaceous, and the fasciae are thinner.

The female was taken almost exclusively on Rhus typhina, July 10; and the male on Eupatorium perfoliatum, Aug. 25. Descriptions of H. arcuatus Robt. will be found in Trans. Am. Ent. Soc. 20: 145, 1893, ♀; Can. Ent. 34: 247, 1902, ♀ ♂.

Halictus pectoralis Sm.

1853 Halictus pectoralis Sm. ♀, Cat. Hym. Brit. Mus. 1: 68.
1898 Halictus pectoralis Robt. ♂, Trans. Ac. Sci. St. Louis, 8: 44.

Female on Crataegus coccinea, June 14; garden blackberry, June 21; Solidago juncea, Aug. 8; Leontodon autumnalis, Sept. 6; male on Solidago, Aug. 9–25; Leontodon autumnalis, Sept. 6. Not common, the specimens are typical, this species has a great north and south distribution.

Halictus foxii Robt.

1890 Halictus gracilis Robt. (not Mor.), ♀ ♂, Trans. Am. Ent. Soc. 17: 316.
1895 Halictus foxii Robt., Trans. Am. Ent. Soc. 22: 117.
1896 Halictus gracillimus D. T., Cat. Hym. 10: 63.

The Maine bees referred to this species may constitute a distinct variety, but it is doubtful if the differentials prove reliable in a large series. The females differ from typical H. foxii in their larger size, area of metathorax larger and with its margin better defined, stigma darker, abdomen blacker and nearly smooth, wings more dusky, tegulae darker. Female specimens taken on Salix Bebbiana, May 12; garden plum, May 28; Crataegus coccinea, June 14; Rubus strigosus, June 16; Epilobium, angustifolium, July 23; male on Aralia hispida, July 30, 1904.

♂.— Length 5 mm. Clypeus produced, apex yellow, labrum black; mandibles yellowish-red in the middle, darker at base and apex; flagellum testaceous beneath, joint 4 longer than 2 plus 3; tegulae black, nervures and stigma dark brown; legs black, tibiae entirely so, tarsi reddish-brown; area of metathorax rougher than in the female, with many parallel rugae extending to the posterior margin; abdomen entirely black, apical margins of segments very slightly testaceous.

Halictus quadrimaculatus Robt.

1890 Halictus quadrimaculatus Robt. (not Schenck), ♀ ♂, Trans. Am. Ent. Soc. 17: 316.

1895 Halictus macoupinensis Robt. Trans. Am. Ent. Soc. 22: 117.

1905 Halictus divergens Lovell, ♀, Can. Ent. 37: 299.

The female specimens were collected on the garden blackberry, June 24; Rosa humilis, July 4; and Aralia hispida, July 27. The Maine bees were at first thought to differ from typical material in the longer head and darker wings, but more extended comparison shows that these characters are not constant. At most the local form is only of varietal importance.

Halictus nelumbonis Robt.

1890 Halictus nelumbonis Robt. ♀ ♂, Trans. Am. Ent. Soc. 17: 316.

Two females on Nymphaea (Nuphar) advena; an oligotropic visitor of the Nymphaeaceae.

(Chloralictus).

Halictus pilosus Sm.

1853 Halictus pilosus Sm. ♀, Cat. Hym. Brit. Mus. 1: 71.

1895 Halictus pilosus Robt. ♂, Trans. Am. Ent. Soc. 22: 117.

Female on Salix, May 7; S. Bebbiana, May 12; Epilobium angustifolium, July 20; male on Solidago, Aug. 21–22. Rare in this locality. The Maine specimens are generally smaller than a large series received from Elkhart, Indiana, where it seems to be a common bee.

Halictus pilosus Sm. var. leucocomus n. var.

♀.— Length 6 mm. Closely allied to H. pilosus in its brassy green color, yellowish wings, punctuation of head and mesothorax, and in the longitudinal striae on the area of the metathorax. It differs from H. pilosus and is allied to H. pruinosus in the color of the pubescence, which is nearly white or only tinged with yellow. The size is smaller than that of pilosus, hardly half as large as specimens from Ind., and in some cases the tegument is much less brassy and more bluish as in pruinosus, for which species this variety at first is usually mistaken. It is, however, undoubtedly derived from H. pilosus.

Female taken on flowers of Prunus, May 28; Crataegus coccinea, June 14; and Solidago, Sept. 6.

Halictus viridatus Lovell.

1905 Halictus viridatus Lovell, ♀ ♂, Can. Ent. 37: 300.

The female is very common visiting a great variety of flowers; Salix Bebbiana, May 12; Aralia hispida, July 28; garden rhubarb, June 12; and Leontodon autumnalis, Aug. 8. The male has the apex of clypeus, labrum, mandibles and tarsi yellow, the tibiae are yellow at base and apex with an oblong black spot in the center; taken on Solidago, Aug. 20.

Halictus oblongus Lovell.

1905 Halictus oblongus Lovell, ♀ ♂, Can. Ent. 37: 40.
1905 Halictus planatus Lovell, ♀, Can. Ent. 37: 300.

Only a single specimen of H. oblongus ♀ has been taken, and while it differs from H. planatus in some minor characters, careful comparison shows that it cannot be separated from the latter species. Both sexes of the bee described as H. planatus are common, and the description of the female should be taken as that of typical material. Female on Salix Bebbiana, May 12; Aralia trifida, May 21; Rhus typhina, July 10; Aralia hispida, July 27; male on Solidago, Sept. 8.

♂.— The head and thorax are bluish-green as in the female, but the disc of the metathorax is more coarsely rugose. From H. viridatus it is separated by the entirely black clypeus, labrum, and the black mandibles rufous at tips. The tibiae are wholly black, the tarsi yellow with the apical joints pale brown, the stigma and nervures dark brown, and the antennae brown-black.

Halictus versans Lovell.

1905 Halictus versans Lovell, ♀, (not ♂), Can. Ent. 37: 39.

Female taken on Epilobium angustifolium, July 23–30. It may be distinguished from H. oblongus by the much darker color of the head and thorax, and the numerous fine striae on the disc of the metathorax not extending to the posterior margin, which is slightly gibbous.

♂.— The male described with this species belongs to H. oblongus. I have, however, a male taken on Epilobium angustifolium, July 23 (the same flower-record as the female), and which from its close resemblance is undoubtedly the male of this species. Length a little over 5 mm. Head and thorax very dark green appearing almost black; face thinly clothed with white hair; mandibles black, red at apices; flagellum brown-black, joint 4 = 2 + 3. Metathorax with fine radiating raised lines at base of area, not extending to the posterior margin, gibbous at apex; tegulae black, stigma and nervures dark brown; legs and abdomen black.

Halictus nymphaearum Robt.

1890 Halictus palustris Robt. (not Mor.), ♀ ♂, Trans. Am. Ent. Soc. 17: 317.
1895 Halictus nymphaearum Robt., Trans. Am. Ent. Soc. 22: 117.
1896 Halictus paludicola D. T., Cat. Hym. 10: 75.

One female on Iris versicolor the latter part of June; two males on Sagittaria latifolia. Rare in this locality.

Halictus hortensis Lovell.

1905 Halictus hortensis Lovell, ♀, Can. Ent. 37: 39.

Female taken on garden plum, May 28; Sedum acre, July 14; Leontodon autumnalis, Sept. 6; male on Sedum acre, July 18; Solidago, Aug. 22; and Leontodon autumnalis, Aug. 17. A common species closely allied to H. sparsus, but sparsus is darker colored and smaller (specimens received from Lehigh Gap, Pa., from Mr. Viereck, are less than 4 mm. in length), with the abdomen obovate, and the pubescence upon the apical segments thinner or sometimes nearly absent. From Washington Co., Wis., through the kindness of Dr. S. Graenicher, I have received specimens of both hortensis and sparsus; the much darker color of sparsus, and the very thin, sparse pubescence on the apical segments easily separates it from hortensis. The specimens of H. hortensis have the hair on the apical segments inclined to pale buff-color, while in the Maine specimens it is usually white though occasionally varying slightly. Dr. Graenicher informs me, however, that on looking through his material he found several specimens with white pubescence.

♂.— Length 5 mm. Head longer than broad, face clothed with short, white appressed pubescence; mandibles black, rufous at apices; antennae testaceous beneath; mesothorax finely punctured; disc of metathorax coarsely rugose, the rugae extending to the apex; nervures and stigma dark brown; tegulae testaceous, or partly dark; legs black, tibiae at base and apex, and tarsi testaceous; abdomen cylindrical, finely punctured, apical margins testaceous.

Halictus albipennis Robt.

1890 Halictus albipennis Robt. ♀ ♂, Trans. Am. Ent. Soc. 17:317.
1905 Halictus nubilus Lovell, ♀, Can. Ent. 37:40.

Female on Sedum acre, July 12; Rosa humilus, July 16; Solidago, Aug. 21; male on Solidago, Aug. 1–17. The Maine specimens exhibit considerable variation in size.

Halictus cressonii Robt.

1890 Halictus cressonii Robt. ♀ ♂, Trans. Am. Ent. Soc. 17:31.

Female on cultivated blackberry, June 24; Epilobium angustifolium, July 23; Rhus typhina, July 11; Eupatorium perfoliatum, Aug. 25. Apparently common throughout New England.

AUGOCHLORA.

While Augochlora confusa is not uncommon in this locality, the rarity of bees belonging to the genus Agapostemon is shown by the fact that I have collected only four specimens in ten years.

Augochlora confusa Robt.

1897 Augochlora confusa Robt. ♀ ♂, Trans. Ac. Sci. St. Louis, 7:324.

Female on Garden plum, May 28; Solidago, Sept. 2; Leontodon autumnalis, Sept. 6; two males on Solidago, Aug. 17.

AGAPOSTEMON.

Agapostemon radiatus Say.

1837 Halictus radiatus Say, ♀, Bost. Jour. Nat. Hist. 1:394.
1897 Agapostemon radiatus Robt. ♀ ♂, Trans. Ac. Sci. St. Louis, 7:397.

One female on Rubus strigosus, June 16; two females on Cornus alternifolia.

Agapostemon viridulus Fabr.

1793 Apis viridula Fabr. ♀, Ent. Syst. 2:342.
1897 Agapostemon viridulus Robt. ♀ ♂, Trans. Ac. Sci. St. Louis, 7:326.

One female taken on Rosa rugosa (cultivated), June 18, 1905.

NOTES ON THE BEE-GENUS EXAERETE.

BY T. D. A. COCKERELL, BOULDER, COLORADO.

The parasitic or inquilinous genus *Exaerete* Hoffmannsegg (*Chrysantheda* Perty) is placed by Ashmead and other authors in the vicinity of *Melissa, Mesocheira* etc., these and many other genera forming a family Nomadidae. That these genera represent several different stocks, is recognized by Ashmead himself (Trans. Amer. Ent. Soc., 1899, p. 65), and of all the discordant elements assigned to the "Nomadidae," the most discordant is *Exaerete*. The brilliantly colored bees of this genus were referred by Fabricius, Latreille, Lamarck, and other early authors to *Euglossa,* and this I believe was more nearly correct than their present position in the midst of the parasitic bees of Anthophorid stock. In structure and appearance they resemble *Euglossa,* and especially the closely related genus *Eufriesea,*[1] in which the pubescence is rather scanty, the mouth parts are dark, and the scutellum has no patch of black tomentum. It is also to be noted that they are parasitic in the nests of *Euglossa* and its immediate allies (cf. Ducke, Zeits. f. wiss. Insektenbiol., 1906, p. 58.). It seems evident that *Exœrete* is derived from the Euglossids, and is related to them as *Psithyrus* is to *Bombus*. Ashmead makes a distinct family, *Psithyridae,* following Schmiedeknecht; but it seems better to recognize only a subfamily, *Psithyrinae,* for *Psithyrus,* and similarly to refer *Exaerete* to a subfamily *Exaeretinae* of the *Euglossidae.*

The immediate occasion of these remarks was a specimen of *Exaerete dentata* (L.), received from the Museum of Comparative Zoology; the first member of the genus I had ever had occasion to study. I refer it to the Linnean *dentata,* but I find no really adequate description of that species, and it is not impossible that there are several forms in the great Amazonian region which would equally fit the Linnean diagnosis. The following particulars regarding the specimen before me may therefore be useful.

Exaerete dentata (L.)

♀. Length (the head somewhat extended) about 17½ mm.; entirely bright green, with strong purple tints on thorax and abdomen in certain lights, the color exactly like that of *Euglossa cordata townsendi* Ckll.; wings exceedingly dark fuliginous; mandibles and labrum without light marks; cheeks with short scanty white

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[1] *Eufriesea* n. n. = *Eumorpha* Friese, Termés Füzetek, 1899, p. 126 (not Hübner, 1806). Type *Eufriesea pulchra* (*Euglossa pulchra* Smith.).

hair above, and long glittering white hair below; long black hairs project from below the mandibles, some of them shining brilliant coppery-red in certain lights; clypeus densely punctured, the median keel feeble; clypeus and front with some purple lustre amid the green, but vertex behind the ocelli, and sides of mesothorax, shining golden-green; mesothorax with strong punctures on a shining ground, and with short pubescence, mixed black and dull white, only easily seen in lateral view; hair of pleura and metathorax dull white; scutellum with a strong shining boss on each side; punctures of scutellum very strong, except on the anterior middle, when they are small and very few on a smooth brilliant surface; no longitudinal groove or ridge on scutellum, and of course no little patch of black hair; tegulae very large, with dense small punctures; second r. n. joining third s. m. a little before its end; legs with mostly light hair, but black bristles on basitarsi behind; outer face of hind tibiæ coarsely tuberculate; abdomen shining, closely punctured, the punctures running together transversely; hair above pale, but very scanty, coarse black bristles beneath about apex; second dorsal segment with the apical margin broadly purple in the middle. The hind tibiae are convex without, and so coarsely punctured and cancellate as to be tuberculate. The broad hind basitarsus has a wide and rather deep groove, which is beset with yellowish hairs. On the middle of the hind femur beneath is a conspicuous tubercle. The second ventral segment is without any peculiar features. The labial palpi, directed posteriorly, reach just beyond the middle of the hind coxae.

Hab.— Teffe, Brazil (*Raulin*, Thayer Expedition).

PROCEEDINGS OF THE CLUB.— At the Annual Meeting of the Cambridge Entomological Club, held in the rooms of the Appalachian Mountain Club on the evening of January 21, 1908, the following officers were elected: President, C. W. Johnson; Secretary, C. A. Frost; Treasurer, F. A. Sherriff; Members at Large of Executive Committee, J. H. Emerton, H. H. Newcomb; Editor in Chief of Psyche and Publication Manager, W. L. W. Field. The retiring President, Mr. Newcomb, delivered a brief address in which he reviewed the recent progress of the science of entomology, and Mr. W. F. Fiske read a paper on "The Butterflies of Western Texas."

At the regular February meeting, held in the same rooms on February 18, Miss E. N. Buckingham spoke on "Methods of keeping Ants and studying their habits," and exhibited various types of portable ant-nests and a convenient carrying-case.

TWO BOOKS ON EVOLUTION.

THERE is a growing demand for elementary treatises upon the subject of Organic Evolution, in which the more important theories are presented briefly and with reasonable impartiality. President Jordan and Professor Kellogg have recently made a welcome contribution[1] to this class of literature. Teachers of Zoology will recognize in "Evolution and Animal Life" many illustrations and passages of text which first appeared in the school book "Animal Life," by the same authors; and will value them more highly in their new setting. The new volume is fully twice as large as the earlier one, and is meant for maturer readers, though admirably suited for use as a reference book in secondary schools. The new title happily avoids confusion with that of Karl Semper's classic work.

Professor Kellogg's "Darwinism To-day"[2] is a scholarly statement of evidence and arguments for and against the Darwinian ideas of species-forming, designed to show the place which Darwinism holds in the growing pattern of modern biological theory. Perhaps too solid a treatise to attract popular attention, it is nevertheless most interestingly written, and must commend itself strongly to the educated layman and the professional biologist alike. The notes and citations appended to the chapters give a convenient synopsis of literature dealing with Darwinism, on a scale which has not been attempted in any other work of the kind. This feature is immensely valuable. Careful readers will lament the small size and occasional indistinctness of the figures by which references to notes are made (those in the body of the book are of the same size as the ones used in PSYCHE'S foot-notes); but this is a minor fault. There is scant room for lamentation in the midst of the enthusiastic welcome which the book deserves.

W. L. W. F.

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[1] Evolution and Animal Life. An elementary discussion of facts, processes, laws and theories relating to the life and evolution of animals. By David Starr Jordan and Vernon Lyman Kellogg. New York: D. Appleton & Co. 1907.

[2] Darwinism To-day. A discussion of present-day scientific criticism of the Darwinian selection theories, together with a brief account of the principal other proposed auxiliary and alternative theories of species-forming. By Vernon L. Kellogg. New York: Henry Holt & Co. 1907.

CAMBRIDGE ENTOMOLOGICAL CLUB.

List of Active Members, Corrected to March 18, 1908.

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Osgood, C. A., Box 73, Arlington, Mass.
Parker, H., 400 Washington St., Boston.

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Sherriff, F. A., Auditor's office, B. & M. R. R., Boston.
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Swett, L. W., 187 Summer St., Malden, Mass.
Thompson, Dr. E. C., 4228 Washington St., Roslindale, Mass.
Weeks, A. G., Jr., 8 Congress St., Boston.

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* Life Member.

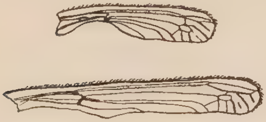
A NEW SPECIES OF TIPULA WITH VESTIGIAL WINGS.

BY R. W. DOANE, STANFORD UNIVERSITY, CAL.

Tipula vestigipennis n. sp. Brownish yellow; head and rostrum yellowish, grayish above, sometimes with a brownish stripe: palpi yellowish at the base, brownish toward the tip; first, second and third segments of the antennæ yellow, the latter darker toward the tip, the remaining segments brownish, growing darker toward the tip of the antennæ, finely pubescent, with the black bases slightly swollen and furnished with a whorl of four or five rather stiff hairs; collar yellowish with median and lateral brownish spots; dorsum of thorax light yellow, dorsal stripes yellow, often indistinct, median stripe divided by a rather broad yellow line; pleura and coxæ hoary; scutellum yellow, lighter laterally, with a narrow median brown line; metanotum light yellow; halteres yellow, knobs black; femora and tibia yellowish, much darker toward the tip; tarsi brownish to blackish; abdomen with broad dorsal, lateral and ventral brown stripes; seventh and eighth segments often almost wholly blackish or brownish; posterior margin of the eighth sternite of the male gently curved, with a broad shallow median incision which is usually filled with the light colored membrane from which arise two tufts of very light yellow hairs, these tufts cross each other close to the base at an angle of about forty-five degrees; to the lateral margins of this sternite are attached rather broad sub-triangular chitinized plates which stand at right angles to the sternite; posterior margin of the ninth tergite with a broad rather shallow circular incision from the middle of which arise two short triangular processes; ovipositor long, rather stout, upper valves straight, acute, lower valves reaching almost to the tip of the upper valves, tips rounded; wings small, more or less distorted, sometimes but little longer than the halteres, sometimes twice as long; veins more or less distinct but crowded together and deformed as shown in the figures. Length, male 15 mm., wing 5 to 9 mm.; Female 22 mm., wing 5 mm. to 6 mm. Hab. San Francisco, Cal., four males, three females. Collected by Mr. F. X. Williams, Stanford University, one female.

Osten Sacken in his "Western Diptera" (p. 209) after referring to *Tipula præcisa* Lw. as a common California species says, "I have two males from Brooklyn, Alameda Co., Cal., with abortive wings which are hardly twice as long as the halteres; in all the other characters, as well as in the structure of the hypopygium, they agree with the males of *T. præcisa*. I suppose this is a case of dimorphism." He then mentions this species as having been taken at the same time and place as the apterous *Bitticus* which is rather common at times.

For a long time we have had in our collections here at Stanford a poorly preserved sub-apterous female Tipula which I have been unable to identify. Indeed I thought it might be one of the common species that had failed to expand its wings after issuing from the pupa. Last winter however Mr. Williams found these sub-apterous forms very common in and about San Francisco and the three pairs that he brought in show that they cannot be placed with *T. præcisa*, which they, at first sight, closely resemble except for the short wings. They differ from *præcisa* in several respects, the most important of which are in the structure of the hypopygia and the ovipositors. In *præcisa*, which is one of our most common California forms, the posterior margin of the eighth sternite of the male has a very deep rounded incision which is bordered, broadly toward the apex, narrowly on the sides, by a lighter colored membrane from the middle of which arise two parallel tufts of long reddish hairs. In *vestigipennis* this sternite is only gently excised medianly, the whitish membrane almost or quite filling the incision. The two tufts of whitish hairs which arise from this membrane instead of extending parallel cross each other close to the base at an angle of about forty-five degrees. The posterior margin of the ninth tergite of the male of *præcisa* has a very deep broad V-shaped incision which almost or quite divides the tergite. In *vestigipennis* the posterior margin of this tergite is gently rounded with a median pair of brownish triangular processes. There are other differences in the hypopygia but these are the most striking and easily detected. The most noticeable difference in the ovipositors of the two species is in the shape of the tip of the upper lamella. In *præcisa* they are obliquely truncated and slightly excised. In *vestigipennis* they are drawn out to a very sharp point.



Wings of *Tipula vestigipennis*

So we have here not a case of dimorphism as Osten-Sacken suspected, but another species of this family Tipulidæ, which is so abundantly represented in California, in which the wings are apparently becoming vestigial. The fact that there is so great a variation in the degree of development in the few specimens before me would indicate, it seems, that this tendency or condition is only a recently acquired one for although they can no longer serve as organs of flight they have by no means reached the stage of degeneration that is represented by the females of *Tipula simplex* Doane. (Ento. News, Vol. 18, No. 1.)

So far this species has been recorded as most abundant in the wind-swept hills southwest of San Francisco where Mr. Williams says they occurred by the hundreds, usually on the sides of the hills away from the ocean or in the lower places between the hills. This would at first suggest that the winds might be a factor in this change that is being brought about but the same species is also found further inland where strong winds very rarely occur. As pointed out in the article on *T. simplex* we can hardly see how natural selection can be the cause of such changes as this. Heterogenesis would more easily explain such cases.

We propose, if possible, to study large series of these for a few years to see if any appreciable change is actually taking place at the present time.

NOTES ON THE INHERITANCE OF VARIATIONS IN THE COLOR *PATTERN OF CRIOCERIS ASPARAGI*.[1]

BY FRANK E. LUTZ, COLD SPRING HARBOR, N. Y.

Crioceris asparagi is the ordinary asparagus beetle. Both males and females hibernate as adults in the stalks of dead plants — chiefly asparagus. They emerge about the middle of May, and eggs are laid in a few days. These hatch in 2 to 4 days. The larvæ feed on the asparagus for from 1 to 3 weeks and then go into the ground to pupate. The pupal stage is from 4 to 10 days in duration. The maximum number of offspring I was able to rear from a single pair was 57. Copulation is repeated and frequent. There seem to be, normally, two generations a season, although a few of a third generation can be procured. It is comparatively easy to keep the adults over winter in glass vials loosely stuffed with paper.

In doing pedigree work with *Crioceris* much time can be saved by growing asparagus seedlings where beetles can not get at them. Otherwise, one must look over the "leaves" of the food plant very carefully to guard against the introduction of wild eggs or larvæ. If a branch of asparagus be put in a vial with a gravid female she will lay freely upon it and the larvæ may be fed in the vial by supplying fresh food daily. When full grown, they will pupate in the vial even without earth to go into. However, I found the following plan much easier. Asparagus seedlings were grown in pots. Then a lamp chimney was put over the seedlings and partly sunk into the earth. The top was covered with netting. Into this the mated pair was put. After ten or a dozen eggs were laid the pair was transferred to another similar cage. The larvæ which hatched fed on the growing seedlings and when full grown went into the earth to pupate. By that time most of the asparagus had been consumed, so that when the beetles emerged they could easily be seen and removed for recording and mating.

The elytra of *Crioceris* are blue-black in ground color with a reddish anterior and distal border. There are three yellow areas or "spots" on each elytron. These spots are frequently united in various ways giving quite a range of variation in color pattern. The character whose inheritance was studied was the joining of the anterior and middle spots. It will be seen in the figure that the gradation from *a* to *e* is perfect, the melanic pigment disappearing last (or coming in first, according to the view-point) from a small dot in the centre of the band of union. Furthermore, the two elytra of a single insect occasionally show the two extremes of this range and the intermediate combinations are common. This phenomenon is not illustrated in the figure. At first sight this is hopeless from a Mendelian standpoint. It was found, however, that "spots united" is, within limits, recessive to "spots distinct" in the Mendelian sense.

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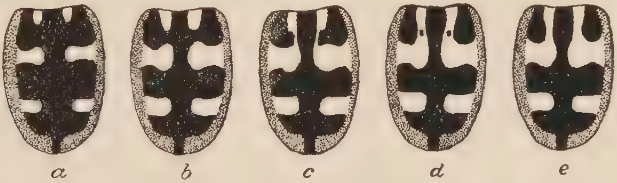
[1] A study of the inheritance of variations in the color pattern of this beetle was started several years ago, but owing to the press of other work there is little likelihood of the present writer's completing it in the near future. These notes are submitted in the hope that some one may take up and solve the several important problems which are involved. The cut is kindly loaned by The Carnegie Institution of Washington.

A female of pattern *a*, mated with a male *c* on the left elytron and *e* on the right (DD × RR) gave 37 offspring only one of which had any sign of union of the spots. The latter had the spots distinct on one elytron and only slightly joined on the other. Another similar mating gave 42 in 47 offspring with no sign of union of the spots. The remaining 5 had a very slight joining on one elytron. A female having *e* on the right and *b* on the left by a male *b* on the right and *c* on the left (RR × RR but with the recessive characteristic only slightly developed) gave 16 offspring all but one of which had the spots more or less united. Eight matings of spots united × spots united gave 132 offspring of which only 3 had the spots distinct. Four matings of DR × DR were obtained. The result was spots distinct : spots united : : 11: 6, 22 :9, 34 : 13, and 15 : 7, or a total of 82 : 35. Three matings of DR × RR gave spots distinct : spots united : : 8: 8, 3 : 3, and 13 : 12, or a total of 24 : 23. These results are surprisingly close to Mendelian expectation. Ten matings of *a* × *a* (DD × DD) gave 285 offspring only 6 of which had the spots at all joined.



Variation in the Color Pattern of *Crioceris asparagi*.

Thus we have here a good case of a perfectly graded variation obeying rather closely the Mendelian law. Spots joined, even slightly and on one elytron only, marks a "pure" recessive individual. However there are variations in the relative potencies of the allelomorphs such as have been found in the cases of height or nostrils in chickens, abnormal wing veins in *Drosophila* and other characters. Some of the interesting problems suggested are: (1) Is pattern *c*, for example, dominant over pattern *e* — both in the recessive group? (2) Pattern *b* seems to be characteristic of the DR's. In how far is this so? (3) Specimens occur in which the middle spot is joined to the posterior one. How does this character behave in inheritance? (4) Specimens having all the spots joined are more common near Washington, D. C., than near New York. Is there a definite geographic variation, melanism increasing toward the North? (5) How is the color pattern affected by experimentally modified environment?

ENCARSIA VERSICOLOR SPECIES NOVUM, AN EULOPHID PARASITE OF THE GREENHOUSE WHITEFLY, *ALEYRODES VAPORARIORUM* WESTWOOD.

BY A. ARSÈNE GIRAULT, OFFICE OF THE STATE ENTOMOLOGIST, URBANA, ILLINOIS.

Female: — Length, 0.62–0.69 mm.; av. length, 0.6545 mm.; expanse, excluding cilia, 1.309 mm.; width of forewing, 0.145 mm.; length of forewing, 0.545 mm.; length of head (dorsal aspect), 0.109 mm.; thorax, 0.273 mm.; abdomen, 0.273 mm.; length of ovipositor, balsam mounts, 0.145 mm.

General color pale cadmium yellow, marked with variable dusky. Cephalic sides of thorax, mesopleura, metapleura, tips of scape, base of pedicel, and occipital region at apex of the neck with more or less dusky; apical joint of antennæ sometimes dusky. Basal two-thirds of dorsum of abdomen, tegulæ, and cephalic half of axillæ, dusky, in the former case usually deeper on the two proximal segments and especially at the meson, forming two (2) more or less rounded spots; incisions of abdominal segments dorsad paler. A discal inverted triangular area with concave sides, in the mesocutum, slightly duller in color; this becomes wholly black in the male. Eyes blue green, apparently with a conspicuous central dark spot from lateral aspect, but which varies in position with the aspect, always appearing in the plane of the perpendicular; from latero-dorsal aspect, apparently two, one in the center of the eye and one at its dorsal apex. Eyes prominent, rounded, and rather coarse, and with moderately abundant short hairs. Caudal edge of mesoscutum, between the bases of the parapsidal furrows, black or darkened, straight or very slightly convex. Ocelli in a small isosceles triangle on the dorsal aspect of the vertex, somewhat nearer the occipital margin, the lateral ones farther from the margin of the eyes on each side than from each other, and the distance between them is at least twice greater than the distance between either and the apical (cephalic) ocellus; the ocellar triangle margined outwardly by two converging sutures meeting just cephalad of the apical ocellus; medio-cephalic portion of the cephalic ocellus concolorous with body, the caudal border margined with ruby red; the latero-caudal portions of the two caudal ocelli concolorous, the cephalic borders margined with ruby red; the ocelli therefore are ruby red and pale cadmium yellow.

At the caudal margin of the vertex, beginning slightly caudo-mesad of each lateral ocellus, at the occipital margin, and slightly obliqued latero-cephalad toward the apical margin of each eye, is a conspicuous dusky or darkened carina, one on each side; apparently these do not join; these carinæ are margined caudad by more or less dusky, and they do not quite approach the margin of the eye. Head rugulose, but portions of the lower face near the eyes delicately hexagonally sculptured; occiput rugulose. Thorax more regularly sculptured into delicate hexagonal figures, fainter or absent on the narrow parapsides, but present on mesoscutellum, mesoscutum and axillæ. Scutellum normal, hemispherical, but with a regularly convexed cephalic margin; mesopostscutellum narrow. A few long setæ on thorax.

Abdomen sessile, oval, about equal in length to the thorax, at least portions apparently very delicately polygonally sculptured; segments, unequal.

Antennæ inserted near the mouth border, 8-jointed, with a 2-jointed club; moderately uniformly hairy, except the naked basal third of scape. Scape slender, slightly curved and thicker in the middle, longer than the next three joints combined, its basal third naked, pale and constricted. Pedicel short and thick, truncate apically, and tapering to a point caudad, the thickest joint, appearing somewhat swollen in comparison with the next joint, though normal, slightly longer than the next joint (funicle 1), and longer than wide; funicle 1 cylindrical, longer than wide, the shortest and most slender joint, though very nearly as wide as funicle 2, and about two-thirds its length; funicle 2 a third longer than 1, slightly wider, longer than the pedicel, and about two-thirds the length of funicle 3; the next four joints subequal, cylindrical, funicle 4 very slightly broader and longer, all about a third longer than funicle 2; basal joint of club slightly shorter than the apical joint, subtruncate apically, subequal to funicles 3 and 4, longer than funicle 2; apical joint cylindrical oval, gradually tapering apically; club joints distinct. Antennæ apparently longitudinally finely rugulose, most evident on the pedicel.

Legs normal, all tarsi 5-jointed, the basal joint of the intermediate tarsi not especially long, shorter than the following four joints combined, the middle tibial spur not half as long as the basal tarsal joint of the intermediate legs, and rather slender. Legs hairy, trochanters and coxæ pallid; at least the cephalic and caudal coxæ longitudinally striate, and the legs apparently so, like the antennæ.

Forewings narrower than usual, the venation dusky pale yellow, appearing dark when wings are closed, and in some balsam mounts. Marginal vein twice thicker than the submarginal, about equal to it in length, or slightly longer, and bearing 8 marginal bristles from papillæ arising from its edge; 7 of these papillæ are usually distinct, but all of the bristles are sometimes hard to make out; these bristles longer than those costal fringes immediately succeeding, at apical end of the marginal vein; there are also two shorter bristles from the submarginal vein, and one from the surface of the tegula; submarginal vein crenulate interiorly. From the surface f the marginal vein also arises another row of about 7 bristles. Stigmal vein inlefinite, sometimes apparently entirely absent, but in reality short or sessile, near the ostal margin, paler, and with a hook-like termination. Basal half of forewing lightly dusky, especially that portion of its surface bounded by the marginal vein; more or less round, conspicuous, naked area just below and beyond the stigmal ein, reaching the costal edge, but not invading the caudal half of the wing; also a nore or less distinct bare path around the margin of the apical half of the wing, rom the naked area in the stigmal region around to a point on the caudal margin of he wing just opposite to it, appearing as if the second row of cilia was absent. Bristles r fringes of forewing long, especially on the caudo-apical aspect. Forewing modertely ciliated; opalescent.

Marginal vein of hind wing longer than submarginal, and bearing from 7 to 8 ristles along its edge, and 2 shorter ones at its junction with the submarginal; the nterior of the wing bears two main rows of cilia, one near the costal edge, and the ther following the caudal margin but farther from it. A portion of a third, and erhaps a fourth, present between the two in the basal half of the wing. Costal ringes short.

From ventral aspect, the cheeks have two furrows, converging towards the oral pening, and originating from opposite ventro-lateral margins of the eye. Ventum niformly concolorous, the coxæ and trochanters paler; labrum dark. Ovipositor ot exserted, included within the slightly projecting valves; in balsam mounts, owever, generally free for its entire length, but not reaching beyond the tip of the bdomen. Mandibles minute, apical half fuscous, blunt, and with three sinuations r obtuse and delicate teeth at apex.

[Described from 77 specimens.]

Male: — Length, 0.50-0.58 mm.; av. length, 0.546 mm.; expanse, excluding ilia, 1.090 mm.; width of forewing, 0.145 mm.; length of forewing, 0.491 mm.; ength of head (dorsal aspect), 0.091 mm.; thorax, 0.199 mm.; abdomen, 0.219 mm.; ength of genitalia, exserted, 0.109 mm.

Differs markedly from the female in color, the dusky areas of the body present n the latter, piceous black or nearly so in the former, with the exception of the general olor of the wings.

The triangular area on mesoscutum, barely duller or slightly dusky in the emale, black in the male, the triangular area of the ocelli black, most of the abdomen, xcepting extreme apex, black, including the ventum, the antennæ dusky, the coxæ nd femora marked with dusky; most of the metapleura black; cheeks and axillæ lack; marginal and submarginal veins darker; thoracic venter more or less dusky.

Eyes dark reddish. Scutellum, lateral margins of mesoscutum, and vertex conspicuously pale cadmium yellow. Otherwise as in female, with the exception of antenna and abdominal characters. Abdomen more cylindrical.

Antennæ more uniform. Scape and pedicel as in the female, but shorter Scape not exceeding the combined length of the three following joints; pedicel still longer than wide, but distinctly shorter than funicle 1, not more than two-thirds it length; funicle uniform, the joints all subequal in length and width; funicle 1 however, shorter than the others; funicle joints cylindrical, subtruncate at ends, an well separated; in balsam mounts apparently hairless, and with two distinct spine arising, one from each side of the apical ends of the flagellar joints (also present i female, but smaller); club 2-jointed, the basal joint stout, subequal to funicle 4 and one-third longer than the apical joint, which is pointed conical and narrower Flagellum with at least several distinct longitudinal carinæ, the pedicel with fain longitudinal striations.

Genitalia not exserted, excepting in balsam mounts; they are long and slender

[Described from 14 specimens.

To the naked eye, the females are yellow or dusky yellow, and the mal appear to be black. The males are very beautiful.

Seen through a hand lens (Coddington, ½ inch), the female is pale cadmiu yellow, with a few dusky spots on sides of the thorax, the antennæ dusky yellow, t eyes blue green, ocelli apparently red, wings opalescent, their basal halves dusk and the basal half of the abdomen conspicuously blackish. The male is very dar the yellow scutellum, dark venation and eyes, black axillæ, ocellar area, and mesoscutellar area, being characteristic.

When mounted in balsam, some of the structures and colors are obscured, an in many cases it is difficult to make them out correctly. I believe, therefore, that if possible, these minute parasitic Hymenoptera should be described from unprepare specimens, and as soon after death as possible. The eyes of the females becom dark reddish several days after death. In balsam mounts the base of the margina vein in this species is transparent, the eyes apparently spotted with black and sometimes dark throughout, venational and antennal characters variable and often obscured, the abdominal segments pressed out of their normal positions, and th genitalia out of theirs.

Described from 77 females and 14 males, first reared by Mr. John J. Davis March 4, 1908, from *Aleyrodes vaporariorum* Westwood in the fourth postembryoni instar, on *Salvia*, pansy-geranium and other flowers in the greenhouse of the University of Illinois, Urbana, Illinois. Subsequently reared in large numbers fro the same hosts March 7 to 31st, 1908.

Nearest to *Encarsia townsendi* Howard, and *coquilletti* Howard, but easily distinguished from the two species by antennal and tarsal characters, color of the eyes and body, the carinæ on the vertex, and the naked spot on the wings; distinct from all other species by specific structural characters, agreeing, however with *quaintancei* Howard and *pergandiella* Howard in having a naked area on the wings. The most striking characters of this species are the cephalic carinæ, the naked spot on the wings, the slightly dusky basal half of the wings, the peculiar coloration of the eyes and ocelli, and the contrasting colors of the male.

Types: — 9 females, 5 males, in collection Illinois State Laboratory of Natural History (Accession, No. 37474); *cotypes*: 4 females, 1 male, in collection Milwaukee Public Museum, (No. $\frac{1023}{26105}$); and *cotype* No. 11704, United States National Museum Washington, D. C., 3 males, 3 females. All balsam mounts.

Hosts parasitized by this species become blue-black at least by the time of the pupation of the parasite. The latter emerges from a small round hole in the cephalic portion of the thorax dorsad, and is solitary, the parasitic pupa filling nearly the entire cavity of its host. The parasite was exceedingly abundant during March, 1908, in one greenhouse and the percentage of parasitism was at least as high as forty percent; its habits appear to be similar to those of the Aphelininae in general.

A NOTE ON CALOTARSA, AND DESCRIPTIONS OF TWO NEW SPECIES OF CALLIMYIA.

BY CHARLES W. JOHNSON, BOSTON, MASS.

PLATYPEZA (CALOTARSA) PALLIPES Loew.

The great variation in the two sexes of Platypeza has undoubtedly led to confusion that will take some time to straighten out. The relationship of a few have been suggested by Mr. Hugo Kahl in Professor Aldrich's catalogue, but that of *P. velutina* Loew and *P. cinerea* Snow does not seem to be quite clear. It was while trying to correlate the males and females that my attention was called to *Platypeza pallipes* Loew all females, taken at the same time and place as *Calotarsa ornatipes* Town. all males. The latter is not as rare as is generally supposed; I have recorded eighteen specimens, eleven of which are now before me together with nine specimens of *P. pallipes*. On September 3, 1897, while on North Mt., Pa. (above Stull) I captured almost in the same swing of the net *C. ornatipes* and *P. pallipes*. On September 5, 1903, Mr. Owen Bryant while on board the schooner "Sunshine" five miles east of the Isles of Shoals also collected a number of both On September 24 and 28, 1903, six specimens of *P. pallipes* were taken on the windows of the museum of the Boston Society of Natural History, and on October 1 a dead specimen of *C. ornatipes*. That the two represent but one species is evident, as to Calotarsa I prefer to treat it as a subgenus. The bibliography and synonymy will stand as follows:

Platypeza pallipes Loew, Centur., VI, p. 81, 1865. ♀.

Calotarsa ornatipes Town., Can. Entom., XXVI, pp. 52, 102, 1894. ♂.

Platypeza ornatipes Banks, *l. c.* p. 88; Williston, *l. c.* p. 116; Snow, Kansas Univ. Quart., III, pp. 143, 207, pl. XII, fig. 2, 1894, 1895; Johnson, Ent. News, VII, p. 254, 1897; Greene, Ent. News, XIX, p. 241, 1908.

Platypeza (Calotarsa) ornatipes Johnson, Psyche, XI, p. 19, 1904.

Calotarsa ornatipes Aldrich, Ent. News, XVII, p. 123, pl. IV, fig. 2, 1906.

CALLIMYIA PULCHELLA n. sp.

♂ Face brownish, cheeks, occiput and frontal triangle black, with a slight grayish pollen; antennæ brownish black, third joint acutely conical, shorter than the arista. Thorax velvety black; scutellum orange yellow, base and basal angles narrowly margined with black, the four bristles long. Abdomen velvety black, with a wide band of orange yellow occupying the posterior half of the first segment, all of the second and the anterior two-thirds of the third except in the middle, where the black extends almost to the anterior margin; genitalia brownish black. Halteres black. Legs brownish, tarsi black, the hind metatarsi normally thickened. Wings hyaline. Length, 2.5 mm.

♀ Front grayish pollinose. Thorax dull black, brownish on the posterior portion; scutellum and halteres bright yellow. First three segments entirely yellow, the discal portion of the fourth and·part of the fifth grayish pollinose, terminal segment yellowish. Legs also yellow.

Three ♂ and one ♀, collected by the writer along a tributary of the Passumpsic River, at St. Johnsbury, Vermont, June 27 and 28, 1906. Types in the collection of the Boston Society of Natural History.

CALLIMYIA FULVA n. sp.

♀ Front and face blackish, pruinose, occiput deep black, cheeks palpi antennæ and ocelli yellow; third joint of the antenna attenuated, longer than the arista. Thorax and scutellum fulvous, and bearing the following black bristles: one humeral, five notopleural arranged transversely, the lower one much smaller than the others, two intra-alar, two dorsocentral in front of the scutellum and six large scutellar bristles; there are also three dorsal rows of small black hairs the outer rows curving towards the humeri. Abdomen and halteres also fulvous, the pleurae and legs light yellow, wings hyaline, veins yellow, costae brown, with three black bristles at the base. Length, 3 mm.

One specimen collected by writer at Capens, Deer Island, Moosehead Lake, Maine, July 19, 1907, Type in the Boston Society of Natural History.

CALLIMYIA TALPULA Loew.

Callomyia talpula Loew, Centur., IX, 81, 1869.

This species was based on a female taken in New Hampshire. It is velvety black, with yellow legs. Two specimens of the male, one collected in Mt. Greylock, Mass., June 15, 1906, the other at Auburndale, Mass., August 16, agree with Loew's description, and type; the sexual characters are therefore all that need be described. The posterior metatarsi are very broad and almost ovate, the posterior tibiæ are also greatly dilated and as broad as the metatarsi; the genitalia prominent and brownish black. Length, 2.5 mm.

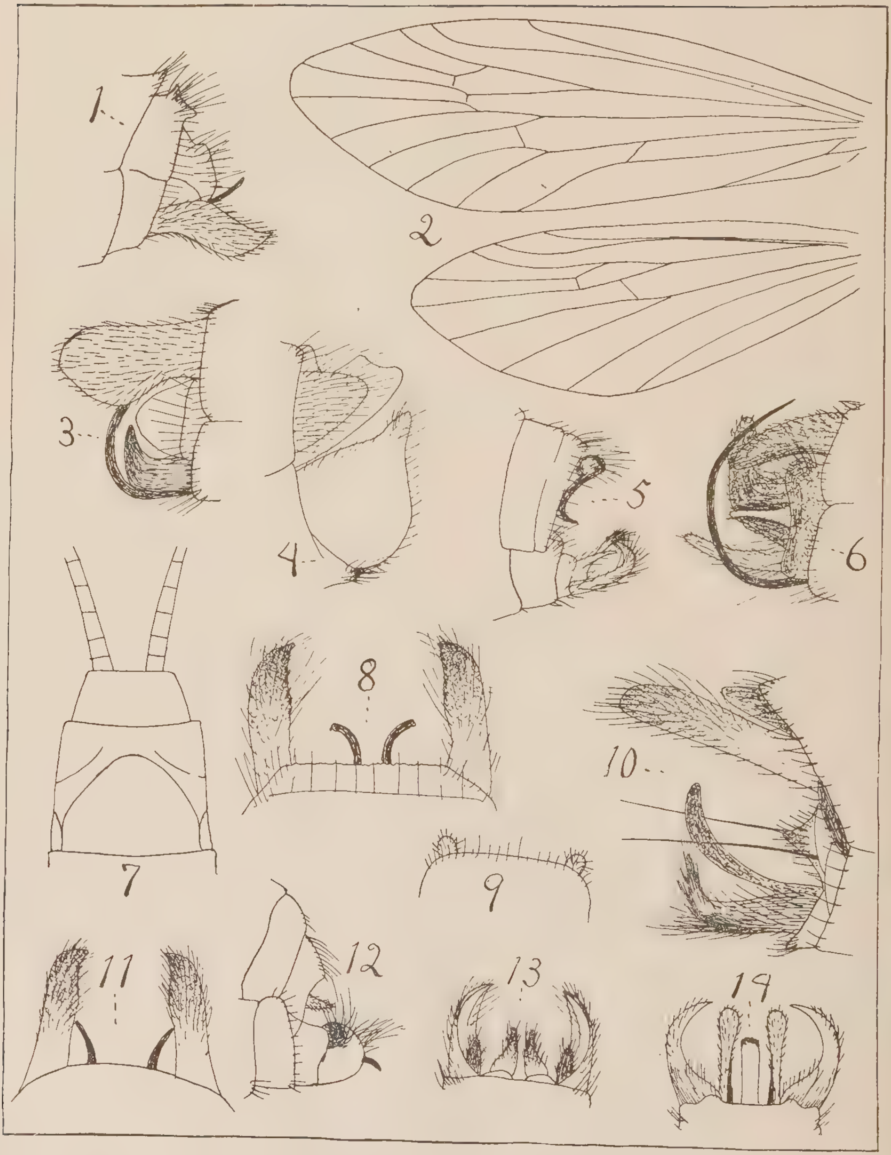
The Screw Worm (*Chrysomyia macellaria*). In the Western Medical Review for December, 1907, Dr. Henry B. Ward, under the title "Nebraska Case of the Screw Worm" gives the following interesting account of the habits of the larva of this fly. "Through the great courtesy of Dr. H. Winnett Orr of Lincoln, I have received recently a number of insect larvæ which were taken from the nasal fossæ of a patient. There were in all a very large number of these larvæ, probably upwards of two hundred, although only a few were saved. Their numbers and the extensive destruction of the tissues which took place during their growth in the host brought the trouble rapidly to a fatal termination in spite of all that could be done. The case was so unusual for Nebraska, and its outcome so serious that an exact determination of the species of insect and of its habits seemed imperatively demanded.'"

The species is found throughout South America and a large portion of North America, especially in the tropical and subtropical regions. It is often very injurious to domestic animals. A small wound when infested, becoming a large and dangerous ulceration. In man they usually infest the nasal fossæ, depositing its eggs in the nostril "to which it is usually attracted by a fetid catarrh. The larvæ grow rapidl reaching maturity in five to eight days."

"Of treatment, Manson (Trop. Dis., 4 ed. 787) says: 'If treated properly an in time by injections of chloroform, carbolic acid, turpentine, infusion pyrethorum and similar substances, the patient may be saved: neglected he will most probabl die.' In any event the mortality is large among these cases. Thus Laboulben lists 15 cases of which 9 were fatal; among the 31 cases collected by Maillard, 21 died. Both of these authors deal with records from South and Central America. In the United States I have found 55 to 60 cases published; in 31 a definite recor was given as to course of the disease and its results, and in 22 of these the outcome was fatal." In the Jour. A. M. A. Dec. 7, Yount and Sudler report 23 cases from Arizona and New Mexico in 1905, only four of which were fatal.

Owing to its wide distribution and variation some 27 specific names have been applied to this species. On the Atlantic coast the species is common as far north as New Jersey. Numerous specimens were taken on a dead shark at Truro, Mass., Sept. 4, 1904, and at Squantum, Mass., Oct. 9, 1905, by Mr. A. P. Morse. It has frequently been taken by Mr. Owen Bryant at Cohasset, Mass., in August. Mr. S. A. Shaw has found a specimen at Hampton, N. H., and the writer obtained a single specimen on a window of the Boston Society of Natural History, August 19, 1903.

C. W. Johnson.



Banks: Insects from Newfoundland.

SOME TRICHOPTERA, AND ALLIED INSECTS, FROM NEWFOUNDLAND.

BY NATHAN BANKS, WASHINGTON, D. C.

In July, 1906, Mr. Owen Bryant visited Newfoundland, and at Grand Lake collected a number of Neuropteroid insects, principally Trichoptera. Through the kindness of Mr. C. W. Johnson the catch was sent to me for examination. As there are several new species in the collection, one new genus, and other rare forms, I have brought them together in the following paper.

Most of the caddice-flies captured belong to two species, *Apatania stigmatella* and *Hydropsyche slossonæ*; the latter was recently described from New Hampshire, the former is a European species of northern distribution. Two other species, *Limnephilus mæstus* and *L. nebulosus*, were represented by many specimens; one is new, the other is recorded from several parts of Boreal America and Europe.

The other species were mostly in a few examples. There are a few other specimens in too poor a condition for identification. Besides the caddice-flies there are two may flies and one stone-fly, the latter a new species. Altogether there are twenty caddice-flies, and three other forms, eight of which are described as new species.

PHRYGANEIDAE.

Neuronia postica Walk.

Four specimens of ordinary type.

Neuronia semifasciata Say.

One specimen; a northern species.

Neuronia concatenata Walk.

One specimen; also a northern species.

LIMNEPHILIDAE.

Colpotaulius perpusillus Walk

One specimen; northern distribution.

Anabolia 4-notata n. sp.

Head reddish brown, darker on middle of the vertex, antennae reddish, basal joint scarcely darker; palpi pale, very slender, in male the last joint is nearly as long as distance from eye to eye, the second joint but little shorter; ocelli large, twice as near to eyes as to each other; a reddish transverse wart on each side of posterior margin, bearing long hairs; pronotum inconspicuous, bilobed, with long fulvous hairs, thorax black on sides, a broad, pale, median stripe; the abdomen brown; legs yellowish with black spines; hind legs long, the sub-apical spurs only about one-eighth the distance before tip. Wings uniform brown, sparsely clothed with black and yellow hairs, a triangular white mark on the thyridium, and one over the arculus, a distinct black dot in base of third apical cell, and in thyridial cell behind the thyridium is a smaller black dot. Membrane distinctly rugulose; discal cell very long, more than twice as long as its pedicel, first apical not its width on discal, and fifth no farther back, fourth as wide as second or third at base; lower fork of median disjointed at the posterior anastomosis, anal cell very long and slender, basal cross-vein plainly before forking of median. Hind wings grayish hyaline, darker toward tip, with a distinct black dot in base of third apical cell; discal cell very long, first and fifth apicals only a short distance back of anastomosis, fourth fully as wide as second at base.

Expanse 33 mm.

Grand Lake, Newfoundland (Owen Bryant).

Limnephilus (*Goniotaulius*) *moestus* n. sp.

Brown; face yellowish, vertex brown in middle; antennae pale brown, annulate with darker, basal joint not very dark; pronotum with mostly black bristles; legs pale yellowish, spines black; abdomen pale at base, black at tip. Wings brown, darker on apical part, heavily marked with pale; costal area pale, a large oblique mark across disc, base of apical cells, middle of first apical, apex of second and third sub-apicals, and a large spot behind cubitus, all pale; also many scattered, often confluent, rounded pale spots. Hind wings pale, dusky at anterior tip. A variety occurs, in both sexes, in which all the area between the median and the cubital veins is pale, and also the apical part behind the anal vein, only a few brown spots in basal part of anal region. In fore wings the discal cell is longer than the pedicel, the first apical not its width on the discal cell, the fourth very narrow at base. The superior appendages of the male are long, sub-clavate, parallel, and wide apart at base, very prominent.

Expanse 20 to 24 mm.

Many specimens from Grand Lake, Newfoundland; also from various parts of New England.

Limnephilus nebulosus Kirby.

Many specimens; also occurs in Europe.

Limnephilus submonilifer Walk.

Four specimens; a common Eastern species.

Limnephilus (*Goniotaulius*) *pulchellus* n. sp.

Black; antennae brownish, annulate with black, basal joint dark; pronotum with yellow bristles; femora black, rest of legs yellowish, spines black. Wings hyaline whitish, or soiled luteous, marked with dark brown; a spot on stigma, a mark occupying more than apical half of apical cells (except the first), and containing several rounded, hyaline spots, a large brown spot on subapicals, usually leaving a hyaline space in base of first, and apex of first and second, a long hyaline spot near arculus, region between anal and cubital veins, pale brown; a large spot below radial sector from its base one-third way out on the discal cell, containing a few pale spots, the radial sector, its branches, and the anastomosis heavily dark brown; usually a little brown on discal cell; and a brown triangular spot from radius to discal cell containing two hyaline spots; hind wings hyaline. Discal cell of fore wings not as long as pedicel; first apical not its width on discal. The sub-apical spurs of hind tibiae fully twice their length from the tip.

Expanse 16 mm.

Several from Grand Lake, Newfoundland.

Limnephilus despectus Walk.

Three specimens; also occurs in northern Europe.

Limnephilus ornatus Banks.

Several specimens, quite common in the North.

Halesus sparsus n. sp.

Head rufous, with a few black bristles, an obliquely transverse wart behind each ocellus bearing black bristles; ocelli large, about three times as near eyes as to each other; palpi pale, slender, last joint not as long as distance from eye to eye; antennae brown, annulate with pale, crenulate beneath, basal joint with a black mark above, thorax rufous, a blackish streak on each anterior corner, and mesoscutellum black, a tuft of black bristles near base of each wing. Abdomen brown above, yellowish beneath, legs pale yellowish, with black spines, sub-apical spurs on hind tibiae about one-fifth distance to base, no spines beneath on last joint of hind tarsi. Wings dark brown, with many rounded hyaline spots, a few of them confluent, about evenly distributed over the wing, except none in the costal area; surface very plainly scabrous; venation brown; only a few blackish hairs on wings; discal cell two and one-half times the length of pedicel, first and fifth apicals their width before anastomosis, radius somewhat sinuous near stigma, the thyridial fork of median vein arises some distance down the cross-vein, lower branch of median not disjointed at anastomosis, anal cell rather short; basal cross-vein at forking of median. Hind wings gray hyaline, venation brownish, discal cell twice as long as pedicel, first apical its width back on discal cell, the fifth but little before anastomosis, the fourth broad, but narrower than second at base.

Expanse 30 mm.

Grand Lake, Newfoundland (Owen Bryant).

Halesus indistinctus Walk.

Three specimens, a rare and interesting species.

Platycentropus maculipennis Kolen.

Several specimens, common in the North.

Apatania stigmatella Zett.

Many specimens, a north European species, previously recorded from the Great Slave Lake district of British America.

SERICOSTOMATIDAE.

Lepidostoma togata Hag.

Four specimens, a common species in the Eastern States.

Alepomyia n. gen.

Basal joints of male antennae moderately long and heavy, longer than length of vertex, wide apart at base, as in *Brachycentrus*; maxillary palpi of male upcurved and appressed to face, densely clothed with broad scale-like hairs; labial palpi dependent, long and slender; venation as figured; in fore wings but four (♂) apical cells, fork three being absent, the discal cell closed in both pairs, the anal vein not running into branch of cubital, but connected back to cubitus a long way before the fork; hind wing with but two apical cells, like *Acrunoecia*. Spurs large and long, 1–4–3 (♂); I can see but one sub-apical on hind tibiae, while the two sub-apicals on middle tibiae are very distinct.

By the distant antennae it is allied to *Brachycentrus* and others of that group, differs from all in but four apical cells, and in anal running into margin, also in the spur-formula. Similar in many points of venation to *Crunoecia* and *Acrunoecia*, but the distant antennae, spur-formula and anal venation distinguish it from these and allied forms.

Alepomyia bryanti n. sp.

Head brown; vertex with some white hairs; palpi with black hairs on outer side near base, yellowish near tip and above, two very large longitudinal warts on vertex, one each side near eye, and behind each eye is a smaller curved transverse wart, all bearing yellowish hairs; basal joint of antennae yellowish brown, marked with brown, rest of antennae pale, marked with brown in front near base; thorax and abdomen brown; legs pale yellow, with yellowish spurs. Wings brownish, some black hairs along the veins, the stigmal region in both pairs rather heavily marked; venation as figured. The hind tibia are very long and slender, the spurs are large, the sub-apical one scarcely twice its length before tip.

Expanse 14 mm.

Four males from Grand Lake, Newfoundland.

A female that may belong to the species, has the basal joint of antennae very long and slender, five apical cells, the anal vein is connected near its tip to the branch of cubitus, thus forming a small marginal cell, and the spurs are 1–4–4.

Hydropsychidae.

Polycentropus maculatus n. sp.

Black, head with gray and some yellow hair; antennae yellowish, faintly marked with brown, palpi pale, legs pale yellowish. Wings brown, stigma blackish, a basally forked hyaline mark on thyridium, the outer cross-veins hyaline, a hyaline spot over arculus, two more spots on posterior margin beyond arculus, a rounded spot in middle of the fourth apical cell, and less distinct one in apex of third apical, and in apex of first subapical cell; venation brown; fork four reaching a little before the cross-vein, fork three not reaching to cross-vein, fork one not as long as pedicel; discal cell about as long as pedicel; hind wings grayish, fork one distinct.

Expanse 15 mm.

One from Grand Lake, Newfoundland.

Hydropsyche slossonæ Banks.

Many specimens, previously known from Franconia, New Hampshire.

Holocentropus flavus n. sp.

Body black, head and thorax with short yellow hair; palpi yellowish brown; antennae pale; legs pale yellowish; abdomen yellow brown. Wings yellowish, clothed with fine short yellow hairs; venation yellowish, stigma brown, a whitish hyaline spot on thyridium, one at end of discal area, and one on the arculus; hind wings yellow gray. In fore wings the discal cell fully as long as pedicel; forks three and four reaching a little before the cross-vein, fork one not as long as the pedicel; in hind wings fork one is absent.

Expanse 16 mm.

One from Grand Lake, Newfoundland.

PERLIDAE.

Isoperla ventralis n. sp.

Head mostly blackish, a yellow spot between ocelli and one each side behind; antennae and palpi brown, pronotum, with broad yellowish median stripe, continued back on the thorax, but indistinct; abdomen brown, apical part of female venter yellowish; legs yellowish brown, femora not darker, setae yellowish. Wings gray hyaline, venation dark brown. Setae nearly as long as the body, joints slender, radial sector usually forked once beyond anastomosis, the fork usually twice as long as pedicel, one cross-vein beyond end of subcosta, about five cross-veins in both median and cubital areas. The antennæ are long and very slender. The male abdomen has a yellowish tip above, and beneath on the penultimate segment the middle of the hind margin has a transverse elliptical, produced part of a yellowish color — a very prominent point.

Length 11 mm.

Several specimens from Grand Lake, Newfoundland.

EPHEMERIDAE.

Siphlonurus sp.

One specimen.

Heptagenia sp.

Several specimens, but all considerably broken.

EXPLANATION OF PLATE.

Fig. 1. Alepomyia bryanti, genitalia, ♂.
Fig. 2. Alepomyia bryanti, venation.
Fig. 3. Holocentropus flavus, genitalia, ♂
Fig. 4. Limnephilus moestus, genitalia, ♀.
Fig. 5. Limnephilus pulchellus, genitalia, ♂.
Fig. 6. Polycentropus maculatus, genitalia, ♂.
Fig. 7. Isoperla ventralis, venter, ♀.
Fig. 8. Limnephilus moestus, genitalia, ♂, top.
Fig. 9. Limnephilus pulchellus, genitalia, ♂, top.
Fig. 10. Limnephilus moestus, genitalia, ♂.
Fig. 11. Limnephilus moestus, genitalia, ♂, top.
Fig. 12. Halesus sparsus, genitalia, ♂.
Fig. 13. Alepomyia bryanti, genitalia, ♂, top.
Fig. 14. Anabolia quadrinotata, genitalia, ♂.

THE APHID GENUS FORDA.

BY S. A. ROHWER, BOULDER, COLORADO.

Last spring Prof. T. D. A. Cockerell sent some aphids of the genus Forda and some ants to the U. S. Nat. Mus. The ants were named *Lasius subniger* Emery while the aphids were supposed to be a new species. They were determined by Mr. Pergande. Mr. Pergande did not care to describe the aphids so I undertook o collect some more of them and work them out, however I was not able to find the same species, but found two others that are thought to be new to science and are herein described. There are but five representatives of this genus known from North America. One (*F. kingii* W. P. Ckll.) from Massachusetts, one (*F. occidentalis* Hart.) from Illinois, one (*F. interjecti* W. P. Ckll.) from New Mexico and he two new species from Colorado.

The work is a contribution from the laboratory of Systematic Zoölogy of the University of Colorado. I am greatly indebted to Prof. T. D. A. Cockerell for many suggestions.

The types of the new species have been sent to the U. S. Nat. Mus.

The following table will separate the North American species.

Second and fourth antennal joints not equal, fourth longer; antennal formula 3 (45) 21; color pale green, body covered with fine hair (Ill.) *occidentalis* Hart.

Second and fourth antennal joints equal . . . . 1.

1. Antennal joints one and two equal; antennal formula 35(421); color gray drab to greenish, body sparsely hairy (Mass.) . . *kingii* W. P. Ckll.
   Antennal joints one and two unequal . . . . 2.
2. Fifth antennal joint much shorter than the third; antennal formula 35(42)1; color olive green, legs and antennae somewhat darker (Colo.) . . *olivacea* n. sp.
   Fifth antennal joint (counting spur) equal to or longer than third . . . 3.
3. Upper surface of the body with a thin coat of white meal; color light yellow; length of antennal joints (1) 68, (2) 85, (3) 136-153, (4) 85, (5) 119 + 34 μ (Colo.) . . . . *flavula* n. sp.
   Upper surface of body without meal; color bright yellow; length of antennal joints (1) 45, (2) 60, (3) 120, (4) 60, (5) 114 + 24 (N. M.) *interjecti* W. P. Ckll.

Forda flavula n. sp. ♀. Length 3 mm. Body oval or slightly ovate; color light yellow, the upper surface sparsely covered with white meal; sutures inconspicuous; body without hair; legs and antennae brownish; head rather broad, fairly distinct from rest of body; eyes dark, small, but distinct; cauda similar to *F. occidentalis*, but with a few bristles; beak like *F. occidentalis* except at the apex where the dark lines divide form a V, the apex of which is towards the apex of the beak, length 50 μ; spiracles distinct, light brown; antennae five-jointed; formula 53(24)1 or (53)(24)1; length of antennal joints (1) 68, (2) 85, (3) 136–153, (4) 85, (5) 119 + 34 μ; measurements of middle leg; coxa 85, trochanter + femur 340, tibia 340 (or slightly more) tarsus 153, claw 51 μ; middle tibiae, under high power, have four spines about 6 μ long; a small sensorium at apex of fourth antennal joint and a larger one on the fifth joint at the base of the spur.

Habitat.— Boulder, Colorado, May 9, '07 (S. A. Rohwer). On roots of grass in nest of *Lasius niger* var. *americanus* Emery.

Forda olivacea n. sp. ♀. Length $2\frac{1}{2}$–3 mm. Body ovate to oval; head small and not very distinct from the rest of the body; body without hairs or mealy covering; color olive green, legs and antennae somewhat darker; sutures inconspicuous; eyes dark, very small; cauda without bristles but with very short hair, the sides are not as straight as in *F. occidentalis*; beak as in *F. flavula* 55 μ; antennae five-jointed; formula 35(42)1; length of joints (1) 68, (2) 85, (3) 204, (4) 85, (5) 102 + 17 μ; measurements of middle leg: coxa 85, trochanter + femur 306, tibia 340, tarsus 119 claw 28 μ; a small sensorium at apex of fourth antennal joint, a larger on fifth a little before base of spur, between this large sensorium and base of spur are three smaller ones arranged in a quarter-circle.

Habitat.— Boulder, Colorado, May 9, '07 (S. A. Rohwer). On root of grass in nest of *Lasius niger* var. *americanus* Emery. Not associated with *F. flavula* n. sp.

THE DIPTERA OF THE BAHAMAS, WITH NOTES AND DESCRIPTION OF ONE NEW SPECIES.

BY CHARLES W. JOHNSON.

THE following Diptera were mostly collected by Messrs. Thomas Barbour, Glover M. Allen and Owen Bryant during their trip to the Bahamas in the summer of 1904. The specimens from Mangrove Cay, Andros, were collected by Mr. Bryant, who visited the island after Messrs. Barbour and Allen had returned to the United States.

This collection probably represents but a small percentage of the actual number to be found; it is however practically our first knowledge of the dipterous fauna of these islands, as only eight species have previously been recorded. The diptera of the West Indies have been, for the most part, studied somewhat superficially, owing to the limited amount of material that has been collected. The only exception to this is the island of St. Vincent, where Mr. H. H. Smith made a very extensive collection, which has been studied by Professors Williston and Aldrich,[1] who record upwards of 350 species. The combined lists of Roeder [2] and of Coquillett [3] gives 193 species from Porto Rico. The writer in 1894 [4] recorded 115 species from Jamaica, since that time about fifty species have been added to the list. The number of species recorded from Cuba is about 250.

The species previously recorded have also been included, and the following list of over ninety species represent all that are known to occur on the islands up to the present time.

PSYCHODIDAE.

PSYCHODA ALBIPUNCTATA Williston?

One specimen, Mangrove Cay, Andros, Aug. 1. An imperfect specimen, agreeing with the description in having the hair on the thorax brown and the tibiae and metatarsi annulated with white tomentum. It is however much smaller, being only a trifle over a millimeter in length. Williston's species was described from Havana, Cuba.

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[1] On the Diptera of St. Vincent (West Indies). By Professor Samuel Wendel Williston. *Dolichopodidae* and *Phoridae* by Professor J. M. Aldrich. (Trans. Entom. Soc. London, for 1896, pp. 253–446, pls. VIII to XIV.)

[2] Dipteren von der Insel Portorico, von V. von. Röder. (Entom. Zeitung zu Stettin, 1885, pp. 337–349).

[3] Report on a Collection of Dipterous Insects from Puerto Rico. By D. W. Coquillett. (Proc. U. S. Nat. Mus., XXII, pp. 249–270, 1900).

[4] List of the Diptera of Jamaica with description of new species. By Charles W. Johnson (Proc. Acad. Nat. Sci., Phila., 1894, pp. 271–280).

PSYCHODA sp.

Two specimens, Nassau, June 28.

CULICIDAE.

STEGOMYIA CALOPUS (Meigen).

Culex calopus Meig., Syst. Beschr., I, 3, 1818.
Culex fasciatus Wied., Auss. Zu. Ins. I, 8, 10, 1828 (*non* Fabricius 1805).
Culex mosquito Desv., Mém. Soc. Hist. Nat. III, 408, 1827.
Numerous specimens, Nassau, June 28.

OCHLEROTATUS TAENIORHYNCHUS (Wiedemann).

Culex tæniorhynchus Wied., Dipt. Exot. 43, 1820.
Two specimens, Mangrove Cay, Andros, Aug. 1.

JANTHINOSOMA COFFINI Dyar and Knab, *J. coffini* D. & K., Proc. Biol. Soc. Wash. XIX, p. 134, 1906.

Nassau, Bahamas, June 22, 1903 (J. H. Coffin).

JANTHINOSOMA PYGMAEA (Theobald).

Grabhamia pygmaea Theob. Mon. Culic., III, p. 245, 1903.
Culex nanus Coq., Can. Ent., XXXV, p. 256, 1903.

"We have placed the types of *nanus* Coquillett from Florida and a large series taken by Dr. Coffin in the Bahamas with *pygmaea* Theobald from Jamaica (*Dyar* and *Knab*).

WYEOMYIA BAHAMA Dyar and Knab.

Tarpon Bay, Bahamas Island (T. H. Coffin).

AËDES OBTURBATOR Dyar and Knab.

a. obturbator D. & K., Jour. N. Y. Entom. Soc., XV, p. 9, 1907.
Tarpon Bay, Bahama Islands (J. H. Coffin).

AËDES PLUTOCRATICUS Dyar and Knab.

"Nassau, Andros, San Salvador, Tarpon Bay, and Powell Point, Bahamas" (J. H. Coffin).

Aëdes condolescens Dyar and Knab.

"Nassau, June 24, 1903, Andros, San Salvador, Powell Point and Long Island. Bahamas" (J. H. Coffin).

CHIRONOMIDAE.

Ceratopogon bahamensis n. sp.

Head black, face and mouth parts yellowish; antennae brown. Thorax with a ground color of dark brown or black, covered with a grayish pollen, showing in certain light three indistinct stripes; pleurae reddish or dark brown, with whitish pollinose; scutellum dark yellow; metanotum black, grayish pollinose. Abdomen black, segments with a narrow posterior margin of light yellow, venter yellow. Legs white, tips of the femora, tibiae and all the joints of the tarsi narrowly banded with black. Halters yellow. Wings hyaline. Length, 1 mm.

Three specimens, Mangrove Cay, Andros, Aug. 1.

Tanypus sp.

One specimen, Mangrove Cay, Andros, Aug. 1.

MYCETOPHILIDAE.

Sciara sp.

Four specimens, Mangrove Cay, Andros, Aug. 1.

STRATIOMYIDAE.

Odontomyia sp.?

A larva "found in a dry pond hole, Mangrove Cay, Andros, Aug. 4" (*Owen Bryant*).

TABANIDAE.

Chrysopis flavidus Wiedemann.

Two specimens, Strangers Cay, July 14.

Tabanus lineola Fabricius.

Thirteen specimens, Strangers Cay, July 14; Abaco, July 17.

Tabanus sp.

One specimen (♂), immature, Abaco, July 17.

BOMBYLIDAE.

HYPERALONIA CERBERUS (Fabricius).

Anthrax cerberus Fabr., Ent. Syst., IV, 256, 1794.

Exoprosopa serveillei Macq., Dipt. Exot., II, pt. 1, p. 124, pl. 16, fig. 3, 1840.

Hyperalonia serveillei Coq., Proc. U. S. Nat. Mus., XXII, 251, 1900; Aldrich Cat'l N. Amer. Dipt. p. 225, 1905.

One specimen, Abaco, July 7. This species has been recorded from Nassau, and from Porto Rico by Mr. D. W. Coquillett. My Jamaica record is based on the *cerberus* as figured by Macquart, not of Fabricius. The relegating of *E. serveillii* to a synonym of *E. cerberus*, does away with a dispute as to the standing of the species, as Macquart did not describe the species, but only figured a wing, with the name on the plate and again on page 124 under — "Explication des figures" Mr. Coquillett concurs with me in the above synonymy.

EXOPROSOPA PARVA Loew.

Six specimens, Nassau, June 28; Abaco, July 6, and Strangers Cay, July 14.

ANTHRAX LATERALIS Say.

Nine specimens, Nassau, June 28; Abaco, July 17; Strangers Cay, July 14, and Mangrove Cay, Abaco, Aug. 4.

ANTHRAX TRIMACULA Walker.

Four specimens Nassau, June 28; Abaco, July 6.

ANTHRAX BIGRADATA Loew.

Eight specimens, Nassau, June 28, Abaco, July 6, Strangers Cay, July 14.

ANTHRAX LUCIFER (Fabricius).

Eight specimens, Nassau, June 28.

PHTHIRIA SULPHUREA Loew.

Three specimens Mangrove Cay, Andros, Aug. 1–4.

GERON SENILIS (Fabricius).

Three specimens Mangrove Cay, Andros, Aug. 1–4.

THEREVIDAE.

PSILOCEPHALA OBSCURA Coquillett.

P. obscura Coq., Can. Ent., XXV, 229, 1893.

One specimen (♂) Strangers Cay, July 14. This species was described from a single female, collected by the writer at Kingston, Jamaica, April, 1891. The male differs from the female in having the abdomen entirely whitish pollinose, with white pile; hypopygium yellow. Length, 5 mm.

ASILIDAE.

PROCTACANTHUS RUFIVENTRIS Macquart.

One specimen, Strangers Cay, July 14.

ERAX RUFITIBIA Macquart.

Three specimens, Stranger's Cay, July 14. The *E. haloesus* Walker from Jamaica seems to be referable to this species.

DOLICHOPODIDAE.

PSILOPODINUS CHRYSOPRASIUS (Walk.).

Four specimens, Nassau, June 28, Mangrove Cay, Andros, Aug. 4.

PSILOPODINUS CAUDATUS (Wied.).

One specimen, Mangrove Cay, Andros, Aug. 1.

CHRYSOTUS BARBATUS Loew.

Numerous specimens, Mangrove Cay, Andros, Aug. 1–4.

CHRYSOTUS PICTICORNIS Loew.

Two specimens, Mangrove Cay, Andros, Aug. 1.

CHRYSOTUS OBLIQUUS Loew?

One specimen, Mangrove Cay, Andros, Aug. 1.

EMPIDIDAE.

DRAPETIS FLAVIDA Williston.

Three specimens, Mangrove Cay, Andros, Aug. 4.

PHORIDAE.

APHIOCHAETA SCALARIS (Loew).

Four specimens, Nassau, June 28.

PIPUNCULIDAE.

PIPUNCULUS SUBVIRESCENS Loew.

Eleven specimens, Nassau June 28, Andros, Aug. 1.

SYRPHIDAE.

MESOGRAMMA ARCIFERA (Loew).

Two specimens, Nassau, June 28; Mangrove Cay, Andros, Aug. 4.

MESOGRAMMA SUBANNULATA (Loew).

Ten specimens, Nassau, June 28.

MESOGRAMMA sp.

One specimen, Abaco, July 7.

BACCHA CLAVATA (Fabricius).

One specimen, Mangrove Cay, Andros, Aug. 1.

OCYPTAMUS FUSCIPENNIS (Say).

Three specimens, Abaco, July 6, and one from Mangrove Cay, Andros, Aug. 1.

VOLUCELLA OBESA (Fabricius).

Four specimens, Nassau, June 28.

VOLUCELLA EUGENIA Williston.

Two specimens, Nassau, June 28, and Abaco, July 6.

ERISTALIS VINETORUM (Fabricius).

One specimen Nassau, June 28.

ERISTALIS ALBIFRONS Wiedemann.

Two specimens, Mangrove Cay, Andros, Aug. 1.

ERISTALIS ATRIMANUS Loew.

One specimen, Mangrove Cay, Andros, Aug. 4.

TACHINIDAE.

EUPHOROCERA CLARIPENNIS (Macquart).

One specimen, Mangrove Cay, Andros, Aug. 1.

Sturmia austrina Coquillett.

Nassau. Bred from a Pyralid (H. G. Dyar).

Sturmia subvaria (Walker).

Tachina subvaria Walker, Insecta Saund. Dipt., p. 299, 1856.
One specimen, Abaco, July 6.

Gonia pallens Wiedemann.

One specimen, Nassau, June 28.

Exorista sp.

One specimen, Mangrove Cay, Andros, Aug. 1.

DEXIIDAE.

Melanophora roralis (Linné).

One specimen, Mangrove Cay, Andros, Aug. 4.

SARCOPHAGIDAE.

Peckia plumipes Desvoidy.

Two specimens (♂ ♀) Mangrove Cay, Andros, Aug. 4.

Sarcophaga incerta Walker.

Numerous specimens, Mangrove Cay, Andros, Aug. 1–4.

Sarcophaga diversipes Coquillett.

Four specimens Mangrove Cay, Andros, Aug. 4. These agree quite well with the description; there is a tendency for the anterior femora to be entirely black, and the yellow on the tip of the abdomen, to encroach upon the fourth segment. It was described from Porto Rico.

Sarcophaga helicis Townsend.

Helicobia helicis Coquillett, Proc. Acad. Nat. Sci. Phila., p. 317, 1895.

Numerous specimens, Nassau, June 28, Mangrove Cay, Andros, Aug. 1–4. In the present unsettled state of the Sarcaphagidae it seems best to retain it in this genus.

Sarcophaga rufipalpis Macquart.

S. rufipalpis Macq., Dipt. Exot., II, pt. 3, p. 102, 1843.
Eleven specimens, Nassau, June 28, and Mangrove Cay, Andros, Aug. 1–4.

The males agree in every respect with the description, and seem to be readily distinguished in having the *palpi yellowish, face and front silvery white pruinose,* the second and extreme base of the third joint of the antennae reddish, the posterior border of the fourth segment and the genitalia reddish and the *posterior tibiae with a wide fringe of long hairs.* In the females the palpi is somewhat darker in most of the specimen, and the fourth segment of the abdomen entirely red. They vary in length from 10 to 13 mm. The species was described from Brazil, and has been reported from Curaçao.

Sarcophaga sp.

Two specimens, Mangrove Cay, Andros, Aug. 1. This species closely resembles *S. rufipalpis* Macq., but the posterior tibiae has not the fringe of long hairs.

Sarcophaga sp.

A small species (5 to 6 mm.) from Mangrove Cay, Andros, Aug. 1. It cannot be readily determined in the present unsatisfactory condition of many of the species of this difficult genus.

Sarcophagula imbecilla Van der Wulp.

S. imbecilla v. d. Wulp, Biol. Cent. Amer., II, p. 289, 1896.

Numerous specimens, Abaco, July 6, Mangrove Cay, Andros, Aug. 1–4. I also have specimens before me from Kingston, Jamaica (C. W. Johnson). Havana, Cuba (C. F. Baker) and Biscayne Bay, Florida (Mrs. A. T. Slosson).

The frontal stripe varies from black to reddish brown, or black with the lower portion reddish, as the bristles on the third longitudinal vein are present in all the specimens, those with the "reddish frontal band" cannot be referred to *S. tenuis* v. d. Wulp, also described from Mexico. The specimens vary in length from 3 to 4.5 mm.

Sarothromyia femoralis (Schiner).

Sarcophila femoralis Schiner, Novara, Dipt., 315, 1868.

Three specimens, Mangrove Cay, Andros, Aug. 1. I also have specimens from St. Augustine, Florida (C. W. Johnson): Lake Worth, Florida (Mrs. A. T. Slosson): Port Antonio, Jamaica (Johnson).

Muscidae.

Chrysomyia macellaria (Fabricius).

Two specimens, Nassau, June 28. Widely distributed throughout North and

South America, and commonly referred to as the "screw-worm," and the *Compsomyia macellaria* of many authors. Over twenty-five specific names have been applied to this species.

MUSCA DOMESTICA Linné.

Two specimens, Mangrove Cay, Abaco, Aug. 1. The House-fly, cosmopolitan.

STOMOXYS CALCITRANS (Linné).

Two specimens Nassau, June 28. The Cattle-fly, also cosmopolitan.

ANTHOMYIDAE.

COENOSIA OVATA Stein.

Two specimens, Mangrove Cay, Andros, Aug. 1.

HOMALOMYIA FEMORATA Loew.

One specimen Nassau, June 28.

BORBORIDAE.

LIMOSINA ILLOTA (Williston).

Borborus illotus Will., Trans. Ent. Soc. London, 1896, p. 434, pl. 14, fig. 164.
One specimen, Mangrove Cay, Andros, Aug. 1.

SAPROMYZIDAE.

SAPROMYZA CINCTA Loew.

Numerous specimens. Nassau, June 28; Mangrove Cay, Andros, Aug. 1.

SAPROMYZA GRATA Wiedemann.

S. grata Wied., Auss. Zw. Ins., II. 456, 1830. Brazil.

Eight specimens, Nassau, June 28; Mangrove Cay, Andros, Aug. 1–4. Distinguished from *S. octopunctata* Wied (*S. ingrata* Will.), in having the two round, deep black spots on the scutellum at the base of the apical bristle, and not on the sides between the bristles.

LONCHAEA RUFITARSIS Macquart.

Four specimens, Nassau, June 28. Apparently a widely distributed species, (New Hampshire to Mexico). With the limited material before me it is difficult to define the many described species, some of which are very closely related or identical.

ORTALIDEA.

EUXESTA ABDOMINALIS Loew.

Four specimens, Nassau, June 28.

EUXESTA ANNONAE (Fabricius).

Three specimens, Mangrove Cay, Andros, Aug. 1.

TRYPETIDAE.

ACIURA INSECTA (Loew).

One specimen, Mangrove Cay, Andros, Aug. 1.

ENSINA PICCIOLA (Bigot).

Acinia picciola Bigot, in Sagra's, Cuba, VII, 842. Tab. XX, fig. 10, 1857.
Trypeta humilis Loew, Mon. N. A. Dipt., I, 81, 1862.

Numerous specimens, Mangrove Cay, Andros, Aug. 1–4. Common throughout the Greater Antilles, Bermuda, Florida, Colorado and Mexico. According to the present rules of nomenclature, I do not see how Bigot's name can be set aside. Loew acknowledges that the synonymy is not doubtful, for he says:— "Through the kindness of Mr. Gundlach, I have been put in possession of numerous typical specimens." An objection to the name cannot be considered a valid reason for placing it in the synonymy.

EUARESTA MELANOGASTER (Loew).

One specimen, Nassau, June 28.

EUARESTA BELLA (Loew).

Four specimens Nassau, June 28; Mangrove Cay, Andros, Aug. 1.

SEPSIDAE.

SEPSIS INSULARIS Williston.

Three specimens, Nassau, June 28.

EPHYDRIDAE.

PSILOPA ACICULATA Loew.

Seven specimens, Nassau, June 28.

Psilopa caeruleiventris Loew.

One specimen, Nassau, July 28.

Psilopa nigrimanus Williston.

Four specimens, Nassau, June 28.

Discocerina sp.?

Two specimens, Mangrove Cay, Andros, Aug. 1.

Oscinidae.

Hippelates flavipes Loew.

Numerous specimens, Nassau, June 28; Mangrove Cay, Andros, Aug. 1–4.

Hippelates pusio Loew.

Numerous specimens, Mangrove Cay, Andros, Aug. 1–4.

Hippelates plebeius Loew.

Six specimens, Nassau, June 28; Mangrove Cay, Andros, Aug. 1–4.

Hippelates proboscideus Williston.

Five specimens, Nassau, June 28.

Hippelates stramineus (Loew).

Three specimens, Nassau, June 28.

Oscinis coxendix Fitch.

Four specimens, Mangrove Cay, Andros, Aug. 1–4.

Drosophilidae.

Drosophila ampelophila Loew.

Numerous specimens, Nassau, June 28; Mangrove Cay, Andros, Aug. 1–4. The common "pomace fly," originally described from Cuba, it has become almost cosmopolitan.

Drosophila punctulata Loew.

Two specimens, Nassau, June 28.

Geomyzidae.

Spilochroa ornata (Johnson).

Heterochroa ornata Johns., Proc. Acad. Nat. Sci. Phila., 1895, p. 306.

Peratochaetus ornatus Czerny, Wien, Ent. Zeit., XXII, 97, 1903.

Spilochroa ornata Williston, Journ. N. Y. Ent. Soc. XV, 2, 1907.

Three specimens, Nassau, June 28; Mangrove Cay, Andros, Aug. 1. This species was described from a single specimen collected at Drayton Island, Lake George, Florida, May 9, 1894. Mrs. Annie T. Slosson has recently taken a specimen at Belleair, Fla. Dr. Williston has made this species the type of a new genus *Spilochroa.*

AGROMYZIDAE.

AGROMYZA AENEIVENTRIS Fallen.

Three specimens, Nassau, June 28.

AGROMYZA JUCUNDA van der Wulp.

Four specimens, Nassau, June 28.

AGROMYZA MELAMPYGA Loew.

Four specimens, Nassau, June 28.

AGROMYZA sp.

One specimen, Mangrove Cay, Andros, Aug. 4.

CACOXENUS sp.?

Two specimens, Mangrove Cay, Andros, Aug. 1.

HIPPOBOSCIDAE.

PSEUDOLFERSIA SPINIFERA (Leach).

Four specimens were obtained from the Cormorant (*Phalacrocorax floridanus*) on Great Sale Cay, July 17, and a single specimen from a Booby (*Sula sula*) off Mangrove Cay, Andros, July 29. They vary somewhat in size, those from the cormorant being from 6 to 8 mm. in length, while the one from the booby is only 5 mm. A widely distributed species more frequently found on the frigate-bird (*Fregata aquilla*).

STREBLIDAE.

TRICHOBIUS PARASITICUS Gervais.

T. parasiticus Gervais, Atlas de Zool., p. 14, 1844.

T. dugesii Towns., Ent. News, II, 106, 1891.

Several specimens were collected on bats (*Phyllonycteris planifrons*) taken in a cave at Hurricane Hole, Abaco, July 22. The species has been recorded from Porto Rico, Jamaica, Arizona and Mexico. In Mexico it was taken on *Glossophaga soricina.*

WESTERN LEPIDOPTERA — I.

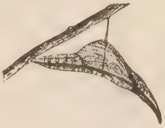
BY KARL R. COOLIDGE, PALO ALTO, CALIFORNIA.

PIERIDAE.

Euchloe pima Edw.— On March 10th, I received from Mr. N. Weil of Calhoun, Kentucky, three *euchloeid* pupae, of which he wrote, "Am sending you by to-day's mail three *anthocaris* pupae; all I think are alive and healthy, notwithstanding the fact that it has been almost exactly two years since pupation — to be exact pupation took place March 10–20, 1906. All were taken on the same food-plant; don't know the name, but think it is a species *Turritis*. Specimens were all taken at Tucson, Arizona." Two of the pupae were of *sara*, or of one of its varieties, and the other is undoubtedly *pima* as it comes from a locality in which that species occurs, and it differs distinctively from the pupa of *sara, ausonides* and *lanceolata*, all of which are known to me.

Pupa.— Length about 19 mm.; thin, sub-cylindrical, of a light mouse brown, streaked and speckled with darker; ventral surface but slightly darker than ground color; posterior end to base of pronotum straight; pronotum rather high, abruptly rounded; palpi-case straight, with not a trace of recurvation, as in other species; spiracles indicated by blackish points.

Dr. R. E. Kunze, of Phoenix, Arizona, writes of *pima*, "I have never yet found a *pima* ovipositing, and only know the plant on which the imago feeds. *Pima* is scattered over the desert, have often followed it yet never took but one ♀ while so doing. The latter looks like the male, and one can hardly tell ♂ from ♀ after capture unless the abdomen is squeezed with a pair of forceps. Last season I did not capture a single female. Mr. W. G. Wright has the only ♀ he ever saw from myself, which is figured in his book. Yet that veteran collector had taken lepidoptera in Arizona for more than twenty years."



Pupa of Euchloe lanceolata.

Euchloe lanceolata Boisd.— Mr. F. X. Williams has kindly made me the drawing here figured of the pupa of *lanceolata*, which was described by myself in the Canadian Entomologist, XL, p. 130. Several of the imagoes have emerged and Mr. Williams tells me they are somewhat smaller than the adults of the var. *australis* Grinnell (see Can. Ent. XL, p. 71). The measurement given for *australis* is 50 mm., and for *lanceolata* 40 mm.

NYMPHALIDAE.

Lemonias eremita Wright.— *Eremita* proves to be, as I have before suspected, only the dark ♀ of *palla*. It seemed incredible to me that a new species of *Lemonias* should turn up in this locality, probably the most thoroughly collected one in California, for it was here that Agassiz, Henry Edwards, Behr, and Lorquin, Boisduval's collector, did a great deal of their collecting. Wright (Butterflies West Coast) figures two females and a "male", but the latter is undoubtedly a female as can be seen by the shape of the abdomen. Hy. Edwards has written (Pr. Cal. Acad. Sci. and quoted in Mead's Report Wheeler Exp. 5, 759, 1875), "This (*palla*) is one of the commonest and most variable of the Pacific Coast butterflies, and is found in every cañon in California and Oregon from April to July. It is dimorphous — one form of the female being blackish, while the other is foxy-red. All intermediate grades are found, and suffused varieties are by no means rare." The extreme light female appears to be quite rare, the usual color being blackish, more or less reddish. *Whitneyii* Behr I would consider only a mountain form of *palla*. Wright records specimens of both *palla* and *whitneyii* from Summit, California. Hy. Edwards also writes under *palla*, "The form described by Dr. Behr as *Melitaea whitneyii* is, I think, only a mountain variety, as I have recently met with some specimens near San Francisco which bear a remarkable resemblance to his types."

I doubt that, if in good series, the two forms could be correctly picked out. *Lemonias sabina* Wright is the light ♀ of *palla*. The synonymy, therefore, I would place as follows:

Lemonias palla Boisd.
= eremita Wright
= sabina Wright
var. *whitneyi* Behr
= pola Boisd.

Lemonias gabbii Behr.— The habitat given for this species by Holland (Butterfly Book) and Wright (Butt. West Coast) is Southern California. Mr. E. J. Newcomer found it abundant this season in a very limited sandy hill at Pacific Grove, Monterey County, in early April. This is probably the northern limit of its range.

Thessalia leanira Boisd. var. *obsoleta* Hy. Edw.— Under the name *leona*, Mr. Wright has redescribed *obsoleta*, the types of both coming from San Rafael, in Marin County, California. Mr. F. X. Williams has also taken it at Fairfax in the same county in late May or early June, and he tells me that it intergrades into typical specimens. As far as I am aware, it is known from no other localities. As the original description is probably accessible to but few, I give it ad verbatim:

"Near San Rafael, in Marin County, I annually take specimens of a curious variety of *M. leanira,* so constant in its characters as to suggest the idea of a new species. In the lower side of the typical form, the secondaries are marked with black blotches near the base, and a double submedian band inclosing a series of seven spots of the pale ochraceous color of the ground. In the variety *obsoleta* these marks are all obliterated, and nothing appears but the black nervules and a slight black marginal line. In all other respects the insect agrees with the typical form. It is somewhat singular that in the locality in which these varieties are found I never met with the true *leanira,* which is a very local insect, and that, although I know several localities in which *leanira* is found, it is only in the one mentioned above that I ever met with the var. *obsoleta.*"

LYCAENIDAE.

Callophrys affinis Edw.— This species, I think, should properly be placed as a synonym of *dumetorum* Boisd. W. H. Edwards, in his original description of *affinis,* (Proc. Phila. Acad. Sci. XIV, 224) writes, "Both *viridis* (= *dumetorum*) and *affinis* are related to *T. Rubi* and to *T. Dumetorum* of Boisduval. The latter I have not seen, but it is briefly described as being entirely like *Rubi,* and to be considered a local variety of that species, a description which does not apply to either of the above named species. *Affinis* approaches most nearly to Rubi in color below, but the upper side is much brighter, and the white spots of under side are wanting. *Viridis* has similar spots to *Rubi,* but the color of both sides, is different, as is that of the antennae, edge of costa and fringe." Dr. Boisduvals description of *dumetorum* is as follows: "Wings olive brown without spots; anal palette of the secondaries nearly obsolete. Under side of primaries russety, a little greenish; that of the inferiors greenish, with a transverse row of small white points." The distinction between the two, it would thus appear, is that *dumetorum* has on the underside "a common sinuous band of elongated, clear-white spots (Edwards's description of *viridis*), while the wings of *affinis* below are immaculate. *Dumetorum* ranges throughout California and I have seen examples from a number of localities. The spotting of the underside varies so that it is rarely that a specimen is found which will answer perfectly to the description of either form. Wright (Butterflies West Coast) says under *affinis* "There are but few examples that are fully and fairly marked with the dots across either wing; most specimens have one or more dots on one of the wings, but in that case they are a sort of intergrade, belonging to neither form." Edwards and Boisduval evidently described their species from extremes. *Dumetorum* and *affinis* are always found in the same locality. Prof. A. J. Snyder writes (Ent. News XI, 302), "*Affinis* and *dumetorum.* — Same localities as *sheridani.* *Dumetorum* always rare, but *affinis* common when found." Dr. Barnes (Ent. News XI, 330) also says, "*Thecla affinis* Edw. — I have only received this species from Utah, though specimens of *dumetorum* from Colorado are often taken with only the slightest trace of the white spots." In this locality *dumetorum* is double brooded, the larva feeding on *Hosackia.* It is quite probable that the larva sometimes, at least, hibernates. I have taken specimens here in early April with all degrees of spotting, some being quite typical of both forms, and I have no doubt that *affinis* and *dumetorum* are one and the same species. Hence the synonymy should stand:

Callophrys dumetorum Boisd.
= viridis Edwards.
= affinis Edwards.

Chalceria cupreus Edw. — In addition to the localities which I gave this species in Psyche, v. xiv, p. 120, 1907, Wright records it indefinitely from "the Sierras," and Mr. E. J. Newcomer took it commonly at Lake Tahoe (Eldorado County, California, 6800 ft. alt.). Dr. Barnes reports it from Beaver Cañon, Idaho, and I have also received a single specimen from near Orr, Montana, between Helena and Great Falls, taken by Dr. Britton.

Cupido lycea Edw. — Egg. Flattened, glabrous, with the micropylar area much concave; in color light delicate green when first laid, gradually changing to a cream color; surface covered with very fine whitish lace-work; diameter about .02 inch.

Young Larva.— Head rather small, retractile, sub-hyaline white, the rest of the larva yellowish green, with long whitish hairs. Eggs found in late June at Martina, Missoula County, Montana. The above brief description is from my note-book: I had a lengthier description of the larva after the first moult, but have unfortunately mislaid it. The only other reference to the preparatory stages of *lycea* is a few indefinite remarks by Mead (Report Wheeler Exp. 785, 1875): "Later in the season, in the South Park an empty egg and a caterpillar, both evidently of some *Lycaena,* were found on wild lupines. The larva was pale green, with one or two whitish dorsal stripes, but was lost before I had an opportunity to make a detailed description."

SATURNIDAE.

Telea polyphemus Cram.— In addition to the list of food plants which I gave for this species (Ent. News XIX, p. 13) in California, Mr. Fordyce Grinnell of Pasadena writes, "Near here I have found the cocoon on willow, so I judge they must feed on that tree. They also feed on the pepper tree." Mr. J. G. Grundel at

Alma in the Santa Cruz Mountains also writes, "Feeds on quince, prune, alder, madrone and hazel-bush." Last winter I found the cocoons abundantly in the prune orchards of this valley. The encina oak (*Quercus lobata*), a deciduous tree, is another food-plant of *polyphemus*.

NOCTUIDAE.

Feralia jocosa Gn.— I took several specimens of this handsome species at Alta, in Placer County, California (elevation about 4000 ft.), in early April. Smith in his Catalogue of the Noctuidae gives New Hampshire, New York and New Jersey as the habitat of *feralia*. Dyar (Bull. 52, U. S. Nat. Mus.) also gives the Atlantic States. Dr. John B. Smith, to whom I am indebted for the identification of this species, writes me, "It is possible that with more material it may be distinguishable from the eastern species; but except for a somewhat greater size I am unable to differentiate it from my series of *jocosa*."

NOTES ON THE FEEDING HABITS OF *CIMEX LECTULARIUS* LINNAEUS.

BY A. ARSÈNE GIRAULT, URBANA, ILL.

THERE are so few specific records of the habits of this insect in the literature of entomology, that I do not hesitate to present for publication the following account of a recent personal experience with it.

On the night of October 29th, 1907, I arrived at Cincinnati, Ohio, near midnight and obtained a room at what is considered one of the largest and best hotels there. This room was on the second floor, and proved to be a rather small one, about 18 feet long and about 12 feet wide. It was elegantly and neatly furnished, with the walls painted a dark gray and ornamented with mural paintings of flowers; the floor was well carpeted. The bed was of iron, painted black, and the whole room, including the rest of the furniture, presented the usual neat, cleanly, and attractive appearance found in hotels of this class. The room was lighted with two 16-candle power electric globes on a chandelier suspended from the middle of the ceiling, and about six and a half feet above the floor. Also these lights were just about four feet above the bottom third of the iron bedstead; the bed was therefore in full glare of the light. A neat, bronzed steam radiator supplied heat.

Upon entering the room a little before midnight, I had turned on the lights and they were burning fully one-half hour before I prepared to retire; it was then about 12:30 A. M. I then approached the bed and happening to glance over it, observed a single nymph of *lectularius*, in about instar III, resting on the spread; this nymph was pale. I killed it. After this, I looked the bed over, and finally decided not to get into it, but to lie across it after disrobing, leave the lights on and obtain such sleep as possible under the circumstances. In carrying this out, I did not disturb the bed linen. After lying stretched out across the bed in this manner for about half an hour, I awoke, and upon looking around me, observed specimens of *lectularius* rapidly crawling away over the bedspread, all of them swollen with blood and having the appearance of being very recently fed. Most of these, fully a dozen, were caught and killed; they were in instars II, III, and IV. The time was about 1:20 A. M. Between this hour and 3:30 A. M., I dozed off from time to time, lying in the same place, but distinctly remember waking at 2 A. M. and 3:20 A. M. and discovering numerous specimens hurrying away over the coverlid. Each time I arose and killed all of the bugs in sight, and also those, which having been glutted from the host, had left it, crawled 2 or 3 feet away, and were hiding in the bed linen; these latter were discovered after a brief search, and were evidently hiding temporarily. At both of these times, the majority of the insects were in instars III and IV, but two were found in V, and one in I, the latter discovered coolly feeding from my fingers, and from its color, evidently obtaining its first meal. At 2 o'clock, I also killed one or two rather pale nymphs of about instar III, crawling toward the host. No adults were observed.

At about 3:30 A. M. I decided to leave the bed, and passed the rest of the morning dozing away in a rocking chair. I must have slept all of this time, until about 6 o'clock, and did not notice any more of the insects.

The attack of these insects lasted several hours, and they did not mind exposure to the light in going to the host; from such evidence as I was able to gather, mostly concerning their color, they appeared to have been hungry; as many of them were pale and flat, and the desire for food probably overcame their negative reaction to light. Each individual after engorgement, left the host and went into hiding, tending to show that, their natural desire for food having been satisfied, the negative reaction to light became dominant again. This fact could as well indicate that they leave the host after engorgement naturally through instinct, whether in darkness or in the light.

Later, at 9 o'clock, I examined the bed and the room, but found no more living insects. The mattress was of hair, covered as usual; the springs, however, were massive, and covered like the mattress; I was unable to get to the under side of them. In a crevice of the mattress was found an exuvia of about the fourth ecdysis. No crevices existed in the walls, excepting one between the molding and the baseboard at the head of the bed; this could have harbored many of the insects, but none were found there, nor any evidence of their presence. I believe the insects had been hiding in the covering of the springs. No eggs were found in the accessible portion of the bed. The temperature of the room was about 75° Fahrenheit. I learned through the kindness of the hotel management that the room had been occupied on Oct. 28th by two persons, but in spite of that fact, the bedbugs which I encountered did not seem to have been recently fed. Unfortunately, I could not ascertain whether the bed had been utilized, or whether they spent the night there.

PSYCHE.

A PECULIAR CASE OF PARASITISM WITH *HEMEROCAMPA LEUCOSTIGMA* SMITH & ABBOT, WITH DESCRIPTION OF A NEW GENUS AND SPECIES OF PTEROMALIDAE.

BY A. ARSÈNE GIRAULT, URBANA, ILLINOIS.

Two similar cases of parasitism, one of which is new to this host, were found to occur with a lot of parasitized specimens of the fall generation of 1907, collected from shade trees at Chicago, Illinois, by Mr. H. E. Hodgkiss then connected with this office. The specimens consisted mostly of dead male and female pupae in their cocoons, a few egg-masses of the moth, and many cocoon-clusters of *Pimpla inquisitor* Say, the whole evidently obtained from shade trees in the various parks of the city. They were in good condition in the spring of 1908, having passed the winter in the cold insectary, and on April 15th, 1908, the Pimpla began to emerge in numbers; hyperparasitism in this case occurring very rarely or not at all, though in some of the Pimpla cocoons fragments of obvious hyperparasitic pteromalines were found. In this lot, the parasitism of Pimpla was normal in every way, but in passing, I desire to record the fact, previously recorded by Howard (1897, pp. 12-13), that in a lot of the same host parasitized by this species kindly collected at Chicago May 19th, 1908, by Mr. J. J. Davis of this office, and consisting of specimens of the fall generation of 1907, four cases of abnormal pupation were found, in that the larva had constructed the cocoon within the host instead of without as is normal. This was found in the instance of four female host pupae, in the first of which were four of the Pimpla cocoons, in the second, five of the Pimpla cocoons, in the third, two, and in the fourth and last, three of the cocoons of the parasite. In still another instance a single cocoon of the Pimpla, apparently *inquisitor*, was found within the body of the full-grown host larva. These Pimplas had all emerged, excepting one or two which were found as adults, dead in their cocoons.

On April 19th, it was noticed that a pteromalid was emerging and upon investigation, the particular host pupa infested with this species was isolated and afterwards dissected, before further emergence occurred. The host proved to be a female pupa in its cocoon, and dissection revealed a compact mass of eggs which had developed in the ovaries of the far advanced pupa, and packed in between these, singly, the living adults of this parasite; a number of meconial discharges were also found. From the single host, 4 males and 15 females were obtained, including the pair which had emerged and was found mating on April 19th. This species did not occur again. It proved to be *Pteromalus cuproideus* Howard (Accession No. 37511, Illinois State Laboratory of Natural History; and 4 females in collection U. S. National Museum) and was first reared from this host by Howard (1897, pp. 28; 55).

On April 23rd, 1908, the whole lot of host pupae were examined and all discarded excepting those still infested with parasites. Seven or eight of the female pupae were obtained which were wholly infested with another pteromalid, occurring under the same conditions as the first species, namely, packed in the body of the host pupae between the compact egg-mass. The host pupa was therefore far advanced in development before killed by the parasite; all of them were very dark in color, and in some, the hairs from the body of the still unexcluded female moth were present.

The numbers of this other parasite found in the bodies of four female host pupae was as follows:

Host	No. of Parasites.				No. meconial
pupa No.	Male.	Female.	Dead Larvae.	Total.	discharges.
1.		14.		14.	1.
2.				51.	13.
3.				73.	36.
4.	7.	21.	6.	34.	32.

The meconial discharges were broken and scattered in quite a number of cases, and these could not be counted from necessity. In a miscellaneous lot of this parasite taken from the hosts, the proportion of the sexes in a total of 131 specimens was 10 males to 121 females or as 1 is to 12. This parasite proved to be a new genus and species (*Tritneptis hemerocampae*) of the subfamily Merisinae of the Pteromalidae and is described in following. It was again present in the specimens sent in from Chicago by Mr. Davis, though both the hosts and the parasites were dead; in a few cases, the entire host pupa was compacted with them.

The peculiarity of these two cases of parasitism rests in the fact of the far advanced stage of development of the host pupae, which in spite of the parasitism had advanced almost as far as the final ecdysis, and the eggs had become perfect in the ovaries. It is usually the case with primary parasites of this family that the nearly full-grown larva is killed, or death results immediately following the penultimate ecdysis, or after preparation for it. In both cases, I do not believe that there can be much doubt but that the parasites are primary, though in a single instance, in one of the female host cocoons was found the decomposed remains of what appeared to be a large hymenopterous (or dipterous?) larva, filling the body cavity, and to one side, two dead females and a dead pupa of the *Tritneptis*. But from the appearance of this dead larva, it did not seem to have been parasitized but dead from pathological causes, and the case may have been one of double parasitism. However, it tends to throw doubt on the nature of the parasitism of the species in question. It may also be mentioned that the parasites were mainly found in the abdominal cavities of the host pupae, a fact which also indicates hyperparasitism; no traces of other parasites, however, could be found, and the evidence points to primary parasitism in both cases.

Howard (1897) mentions a case somewhat similar to the foregoing in speaking of the common hyperparasite of this host, *Dibrachys boucheanus* (Ratzeburg).

Quoting:—"A singular and practically inexplicable instance was observed December 16, 1896, where in a cocoon of the Orgyia a dead female chrysalis was found in an advanced stage of development. The moth was apparently just ready to emerge at the time of death. All of the scales on the body and legs were fully formed and the wings were also fully developed. On breaking the body across, in the interior of the abdomen were found two active living larvae, which were entirely indistinguishable from the larva of this species. The specimen was put aside to await developments, and the writer has at this time no explanatory comments to make." (A footnote is then appended giving reference, among others, to T. A. Marshall in Entomologist's Monthly Magazine, Dec., 1896, where an ichneumonid larva is recorded as having been found alive in the body of an adult *Acherontia atropos*). It seems to me that these cases can be explained by considering that the parasite attacked the host late in its development and in smaller numbers than usual, and at a time when its resistance was high or the parasite was unable to come to maturity before the host had fully developed. It would then be found in the abdomen of the adult, or if in sufficient numbers and early enough may overcome the host just previous to the final ecdysis. This view is supported by the fact that we know of cases of unusually late attack on the part of some parasites. Thus instead of attacking the third grown or younger larva, it attacks the full-grown larva or even the pupa.

In passing, attention should also be called to the fact that the female pupae only were infested with these parasites.

Description of the Parasites.

Family PTEROMALIDAE.

Subfamily MERISINAE.

Tribe *Roptrocerini.*

Tritneptis n. genus.

Male, female:— Head orbicular, wider than thorax. The median line of the face concaved; both mandibles 4-dentate; ocelli in a very flat triangle, merely a curved line in the center of the vertex; ovipositor not exserted; antennae with but a single ring-joint, 13-jointed; the pedicel distinctly twice longer than the first funicle joint; club 3 jointed; antennae inserted far below the middle of the face, near the clypeal border; the first funicle joint the shortest of the joints of the funicle. General color metallic blue-black, the forewings clouded, the stigmal vein subequal in length to the postmarginal vein, slightly longer; the marginal vein distinctly shorter and thicker than the submarginal vein; marginal vein of hindwings long. Metathoracic carina distinct, entire, the spiracle moderate in size and oval in shape. Parapsidal furrows faint, incomplete; scutellum with a faint transverse grooved line at caudal third. Abdomen ovate, the median line of the ventum slightly convex; segments 2 and 3 the longest, subequal, 2 longer than 3, however; segments 4 and 5 subequal, shorter; 6 shorter and narrower; widest at about the fourth segment; the posterior margin of segments 2, 3, and 4, at least, slightly incised or emarginate at the median line, less so on segment 5. Tarsi 5-jointed.

The absence of the spiracular sulci and lateral folds, the sessile abdomen, single tibial spurs of the posterior tarsi, the 5-jointed tarsi, 13-jointed antennae, and venational characters distinctly show the position of this genus, though if it were not for the nearly straight cephalic margins of the axillae and 5-jointed tarsi, it would run equally as well to the Eulophine tribe Hemiptarsenini of the family Eulophidae, where it would come next to *Necremnus* Thomson. Near to *Uriella* Ashm. and *Tropidogastra* Ashm. from which it is separated by the single ring-joint of the antennae.

Type:— *T. hemerocampae* species nova described in following.

Tritneptis hemerocampae species nova.

Female:— Length variable, 2.25 mm. average.

General color metallic bluish black, the abdomen shining; scutellum purplish;

the head, meso- and metathorax with a greenish hue; abdomen with purplish hues; eyes and ocelli dark garnet; the distance between the lateral ocelli and the margin of the eyes is not so great as the distance between these ocelli, but much greater than that between each lateral ocellus and the cephalic ocellus; epicranial lobes convex. Scape and most of the pedicel, and the legs, excepting the coxae, fuscous. Coxae and remainder of antennae blue-black. Eyes with sparse minute hairs, practically naked.

Head and thorax, including the metathorax and axillae, moderately pentagonally punctate, the abdomen apparently smooth, but in reality similarly sculptured with fine shallow lines like net-work. The sculpture of the head and thorax slightly coarser than the surface of the eye. Pleura and coxae less deeply sculptured.

Wings normal, the submarginal vein much longer than the marginal, and the stigmal vein curved, its club with a prolongation at the cephalic extremity. Discal cilia moderately dense and uniform, and a large dusky cloud under the marginal vein extending along and beyond the stigmal vein to the apical fourth of the wing, and across nearly to the opposite (caudal) margin where, however, it is limited by a distinct angular milky-white line which starts in the apical fourth of the wing, curves slightly convexly, and then obliques down (caudad) and in (proximad) toward the caudal margin of the wing, nearly reaching that margin at a point about opposite the middle of the marginal vein, and sharply curving upward (cephalad) and inward (proximad) toward the submarginal vein limiting the proximal spread of the dusky area; this line is not devoid of discal cilia. Under the microscope, the dusky area is also seen to extend through the angle subtended by the stigmal vein and the postmarginal vein and to the caudal margin, beyond the whitish line, in fact faintly suffused over the apical fourth of the wing. Sheaths of the ovipositor barely exserted.

Scape of antennae slender, uniformly cylindrical, about as long as the pedicel and the first three funicle joints combined; pedicel as long as the first two funicle joints combined, subclavate; first funicle joint shorter and narrower than funicle joints 2, 3, 4, 5, 6 and 7, which are uniform, subquadrate and subequal; 2 basal club joints very slightly larger than the apical funicle joint, subequal; the third or apical club joint nearly a half smaller and conical. Antennae uniformly hairy, less thickly so on scape and pedicel.

From many specimens. $\frac{2}{3}$-inch objective. Bausch & Lomb. Coddington lens, $\frac{1}{2}$-inch.

Male:— The same, but more slender. Antennae subclavate, more hairy, the joints more distinct, the funicle joints widely separated; the scape and pedicel dark, funicle and club fulvous. Scape as long as pedicel and first 4 funicle joints combined.

Pedicel five times the length of funicle joint 1, which is abruptly short and narrow, circular or semihemispherical, not more than twice the size of the single ring-joint and of the same shape nearly, and one-third the size of funicle 2; the latter much larger, hemispherical (cephalic end truncate); all funicle joints hemispherical, becoming gradually more wide and short toward the club, so that the 7th or last funicle joint is somewhat lozenge-shaped; club conical, the segments less distinct, about equal in length to the last 3 funicle joints combined, or shorter. In dead specimens, genitalia exserted.

From 10 specimens. ⅔-inch objective. Baŭsch & Lomb. Coddington lens, ½-inch.

Described from 10 males and many females reared from the female pupae of *Hemerocampa leucostigma* (Smith et Abbot), in the insectary of this office, Urbana, Illinois, April 23rd to May 4th, 1908.

Habitat:— Chicago, Illinois.

Types:— Accession No. 37512, Illinois State Laboratory of Natural History, Urbana, Illinois, 1 ♂, 8 ♀'s, tagmounted. *Cotypes*: No. 11923, U. S. National Museum, Washington, D. C., 1 ♂, 3 ♀'s, on tags.

Subfamily PTEROMALINAE.

Tribe *Pteromalini*.

Pteromalus cuproideus Howard, 1897, p. 55.

Female: — Length variable, 2 mm. average.

General color, pale metallic green, with a brassy sheen. In general, head and thorax sculptured, the abdomen smooth and shining; mandibles, scape and legs fuscous, the apical tarsal claw and portions of the femora darker and the apices of tibiae and the tarsi lighter; coxae, however, concolorous with thorax; flagellum (including the pedicel) and apex of the scape deep black tinged with fuscous, in certain lights with a prismatic lustre. Eyes dark red; ocelli concolorous with the eye, or darker, in a flat isosceles triangle in the center of the vertex; the distance between each lateral ocellus and the margin of the eye is twice, or nearly, the distance between each and the cephalic ocellus, and the distance between the lateral ocelli is subequal to, or slightly shorter than, the distance between each laterad and the margin of the eye. Surface of the eyes moderately fine and nearly naked, but a few sparse minute setae are present.

The whole of the head, the prothorax and mesothorax from dorsal aspect (including the parapsides, mesoscutum, mesoscutellum, axillae, and lateral portions of the mesopostscutellum), the dorsal aspect of the metathorax, the thoracic pleura (including the femoral furrows, but excluding an irregular faintly lined area surrounding the insertion of the wings in the direct lateral aspect) and the posterior coxae (but distinctly less so) moderately roughly, nearly uniformly, punctately, sculptured into polygonal areas, generally pentagons; this sculpture is from two to three times rougher than the eye surface. Cephalic and intermediate coxae, sculptured nearly similarly with finer lines; most of the thoracic ventum similarly sculptured (as the cephalic coxae). Metathorax with a faint median carina.

Abdomen shorter than head and thorax combined, normal for the genus, but slightly triangularly produced ventro-proximad, and conic ovate; segment 2 the longest, much longer than segment 3, the latter one-third longer than segment 4, and the remaining subequal in length, excepting the last; the forewings extend for about one-sixth of their length beyond the abdomen. Body covered with moderately sparse, grayish, inclined hairs, thicker on the coxae, legs, apical abdominal segments, at the spiracles, and amounting to a soft, grayish pubescence on the antennae.

Wings normal, hyaline; postmarginal vein about one-third longer than stigmal vein, which is about one-fifth shorter than the marginal vein; stigmal knob ovate, but with a nipple-like prolongation at its apical third on the cephalic margin; submarginal vein twice the length of the marginal. Discal cilia of the wings uniform, close. Venation dusky.

Antennae 13-jointed, with two ring-joints, scape and pedicel less hairy and sculptured with very fine lines. Scape long and slender, projecting beyond the vertex for at least a fifth of its length, at least more than half the length of the remaining joints combined. Pedicel subconic, stouter, slightly more than half the length of the first funicle joint; joints 1, 2, and 3 of funicle subequal, funicle joints 4 and 5 subequal, the former longer, one-fourth and one-third shorter than the 3 preceding joints respectively; funicle 6 sub-quadrate, one-third shorter than the preceding joint; club 3-jointed, the first two joints subequal, about equal in length to funicle 6 but narrower, and the third or apical joint nearly one-half shorter and conic; club ovate in shape, longer than the combined length of the two apical funicle joints. Both mandible 4-dentate, the dentations darker in color than the body of the mandible; the dentations are not symmetrical for both sides. Ovipositor not exserted.

From 15 specimens; ⅔-inch objective, Bausch & Lomb.

Seen from the naked eye the species is very dark.

Male:— The same. From the single specimen at hand, most of the antennae are missing, but enough of the funicle is present to show that they are wholly fuscous, excepting the darker pedicel and apex of scape, unless the few apical joints missing are to the contrary. The abdomen is more like that of the females of most of the species of *Pteromalus,* namely ovate and depressed; in the male, the median carina on the metathorax is also absent, and the lateral folds are less prominent; the antennae also are more hairy.

Redescribed from 1 male and 15 females reared from a female pupa of *Hemerocampa leucostigma* (Smith et Abbot), April 19th, 1908. *Habitat:* Chicago, Illinois.

LITERATURE REFERRED TO.

1897. Howard, Leland Ossian. A Study in Insect Parasitism: etc. Bull. No. 5, technical series, Division of Entomology, U. S. Department of Agriculture, Washington, D. C., pp. 37–38.

I take pleasure in acknowledging the aid kindly given by Mr. J. C. Crawford, U. S. National Museum, who determined the specimens of *Pteromalus cuproideus* Howard.

Gryllodes sigillatus Walker (= *poeyi* Sauss.) in Washington, D. C.— Recently the cosmopolitan cricket *Gryllodes sigillatus* Walk. appeared in countless numbers in the hot-houses of the U. S. Department of Agriculture at Washington, D. C. They are reported as having caused considerable damage to various seedlings, which they cut off near the ground. Myriads of the beautiful little crickets in all stages were found hiding by day in piles of boards in one of the green houses. A few of the adult males, which far outnumbered the mature females, were heard to stridulate at this time.

This species is recorded from Florida by Rehn and Hebard. They took both adult and immature specimens at Miami in February.

A. N. Caudell.

INCIDENTAL CAPTURES OF NEUROPTEROUS INSECTS AT PLANO, TEXAS.[1]

BY E. S. TUCKER, BUREAU OF ENTOMOLOGY, U. S. DEPT. OF AGRIC.

DURING the time in which I was stationed at Plano, Collin county, Texas, covering a period from the first week of May to the end of December, 1907, a general collection of insects was made by myself as opportunities permitted in connection with my work upon the green bug. In the study of the specimens thus taken, the neuropterous insects were the first examples that received specific determinations, and, as a result, the following list of names with data of captures is presented.

Wherever the country of northern Texas corresponds to that about Plano, aquatic insects, particularly the neuropterous kinds, are sure to find attractive haunts on account of numerous streams, though mostly small, which are usually bordered with dense thickets of timber, shrubs and weeds. Many species besides those taken undoubtedly occur since only incidental attention could be given to collecting, but so far as results are obtained, every local record of a species will contribute towards a better knowledge of the insects of Texas.

Acknowledgments are due Mr. Nathan Banks for the principal part of the work in identification of the specimens, although valuable assistance has been rendered by Mr. R. P. Currie in instances relating to some of the dragonflies. The nomenclature and arrangement of the list conforms with the latest catalogue by Mr. Banks, except for the interpolation of the Odonata.

SUMMARY OF FAMILIES AND SPECIES.

Termitidae	1	Mantispidae	1
Psocidae	2	Hemerobidiidae	2
Ephemeridae	2	Chrysopidae	3
Calopterygidae	2	Myrmeleonidae	1
Agrionidae	7	Panorpidae	2
Gomphidae	3	Sericostomatidae	1
Æschnidae	1	Leptoceridae	3
Libellulidae	2	Hydropsychidae	1

Total number of species, 34.

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[1] This list is offered for publication with the courteous consent of Prof. C. E. Sanborn, who directed my experimental work at the time the collections were made.

ORDER ISOPTERA.

Family TERMITIDAE.

Termes lucifugus Rossi. October, winged forms issuing from sod ground wet after rain, wingless individuals at entrance of exit hole were preyed upon by ants of the species *Solenopsis geminata* Fab., var. *diabola* Wheeler.

ORDER CORRODENTIA.

Family PSOCIDAE.

Peripsocus sp., probably new. October, from littered ground in corn field.
Psocus striatus Wk. November.

ORDER ARCHIPTERA.

Family EPHEMERIDAE.

Hexagenia limbata Pict. July to September, at night taken at trap light; August, resting in daytime. Male and females.
Caenis diminuta Wk. August, at night taken at trap light.

ORDER ODONATA.

Family CALOPTERYGIDAE.

Calopteryx maculata Beauv. July.
Hetaerina vulnerata Selys. July.

Family AGRIONIDAE.

Argia agrioidea Calv. June.
  moesta Hag. July.
  sedula Hag. July to October.
  translata Hag. July and August.
  vivida Hag. October.
Enallagma basidens Calv. July, in alfalfa field adjacent to stream; September. Mr. Nathan Banks who identified this species remarked that it is very uncommon.
  civile Hag. November.

Family GOMPHIDAE.

Herpetogomphus designatus Hag. July.

Gomphus militaris Hag. July. The remarks by Dr. L. O. Howard concerning the identification of the single male specimen are as follows: "This specimen was sent to Dr. Philip P. Calvert of Philadelphia, for verification of the determination, since we had no specimens of that supposed species in Washington and could not be certain of its identity from the description. Doctor Calvert reports that he has compared it with the specimens of *Gomphus militaris* in the Academy of Natural Science, which were some years ago compared with Doctor Hagen's type of that species in the Museum of Comparative Zoology. He states that as a result he believes your specimen is also *militaris*, for, although there are some slight differences, they are not greater than those existing between the three males now at the Academy."

Brechmorhoga mendax Hag. September.

Family AESCHNIDAE.

Anax junius Dru. July twilight. Judging from the specimen taken that others in flight were the same kind, numbers of these insects were observed at dusk flying southward after the manner of a scattered flock of birds.

Family LIBELLULIDAE.

Orthemis ferruginea Fab. October.

Plathemis lydia Dru. July.

ORDER NEUROPTERA.

Family MANTISPIDAE.

Mantispa brunnea Say. July, preying upon *Aphis maidis* in corn field; October.

Family HEMEROBIIDAE.

Micromus posticus Wk. August.

variolosus Hag. May at dusk in oat field; August; October.

Family CHRYSOPIDAE.

Chrysopa harrisi Fitch. July; July at night, sweeping; August.

Chrysopa oculata Say. July; July in wheat stubble; August; October; October at night taken at trap light; November.

plorabunda Fitch. July; July in oat field; August and September at night taken at trap light; November.

Family MYRMELEONIDAE.

Brachynemurus abdominalis Say. July; August at night taken at trap light; September.

Family PANORPIDAE.

Panorpa nuptialis Gerst. October.

Bittacus texanus Bks. MS. July.

ORDER TRICHOPTERA.

Family SERICOSTOMATIDAE.

Helicopsyche sp. August at night taken at trap light.

Family LEPTOCERIDAE.

Triaenodes sp. August at night taken at trap light. "A very interesting form," according to Mr. Banks, but the specimen was unfortunately broken in return transit.

Oecetina fumosa Bks. September.

incerta Wk. August and September at night taken at trap light.

Family HYDROPSYCHIDAE.

Hydropsyche sp., near alternans Wk. August; August and September at night taken at trap light; October.

WESTERN LEPIDOPTERA — II.

BY KARL R. COOLIDGE, PALO ALTO, CALIFORNIA.

THE SYNONYMY AND HABITS OF *Pseudohazis eglanterina* BOISD.

DYAR, in a footnote to his description of the preparatory stages of *Pseudohazis shastaensis*,[1] remarks, "The common form of *Pseudohazis* with purplish fore wings has, strictly, never been described. Boisduval says of *eglanterina* 'alae anticae albidocarneae,' which applies to the form described as *arizonensis* by Strecker. Behren's *shastaensis* was described from very black examples of the purple winged form, so this name will retain. The form is constant, and has as good right to specific recognition as any species in the genus." The species of *Pseudohazis* commonly found in California, and plentiful in this valley, I had considered as *eglanterina* Boisd., but recently I sent a specimen to Dr. Dyar and he pronounced it *shastaensis* Behrens. In fact, the eggs for his life-history of *shastaensis* came from Watsonville in this valley. He also gives Yosemite, Monterey County and Portland, Oregon, as localities in which *shastaensis* occurs and in his list of the lepidoptera of North America (Bull. 52, U. S. Nat. Mus.), he gives Rocky Mts. to Arizona as the habitat for *eglanterina* and Pacific States and Colorado for *shastaensis*. The only distinction between the two, so far as known to me, is that *shastaensis* has a more or less pronounced purplish tinge to the wings. Behren's types were very heavily marked specimens. Strecker[2] writes, "The best known and by far the commonest is the Californian form *eglanterina*; it is very variable in the black markings; in some instances being almost as heavily blacked as the variety of *P. hera*, in others it is scarcely more so than in *P. nuttalli* ♀; nor is this diminution of the black confined to the females only as I have males with as little black on as any female I have yet seen, and even less. An extreme case in point is the male aberration (fig. 9) in which the black marks are almost totally obliterated on both surfaces. Though the upper surface of primaries is more generally flesh colored or pinkish, this is not always the case, as I have seen and possess examples of both sexes in which the primaries are the same yellow color as the secondaries, and others in which part are yellow and part flesh colored."

Mr. J. G. Grundel, who has collected by the hundreds the *Pseudohazis* found here, tells me it is quite distinct from Mt. Shasta specimens which he considers typical

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[1] PSYCHE, p. 91, 1894.
[2] Strecker, Supp. Rhop., Heter. Exotic + Indig., p. 138.

shastaensis. I recently saw these and they are strikingly different from our form, being very black, while ours have but little purplish, occasionally but a tinge, and I think specimens could be found quite destitute of purplish. Dr. Dyar says, "The form is constant" and if that is the case the specimens from Mt. Shasta would represent a new variety at least, if the insect found here is *shastaensis.* Dyar also writes that Boisduval's description applies also to *arizonensis* Strecker, but this he places as a synonym of *eglanterina.* Also according to Dyar, *eglanterina* ranges from the Rocky Mountains to Arizona yet Dr. Boisduval (Lep. de la Californie) says of his specimens "Ce bel insect a été élevé de chenilles sur les *Eglantiers,* rosiers sauvages, sur les bords du San Joachim." Holland[1] places both *shastaensis* Behrens (not Behr) and *denudata* Neum., as synonyms of *eglanterina.* Smith[2] gives both *eglanterina* and *shastaensis* specific rank, with *arizonensis* as a synonym and *nuttalli* Strecker as a variety of *eglanterina,* and *denudata* as a variety of *shastaensis.* Dyar's arrangement concurs with this as does Grote's.[3] *Eglanterina* I would consider the common Californian form as that is the insect to which Boisduval gave his name. *Shastaensis* is the northern or mountain variety and is very black, with scarcely any of the characteristic ground color of *eglanterina.* This coming season I hope to gather a large series of specimens for comparison and would be particularly grateful for any representatives of the genus from the Rocky Mountain region. *Eglanterina,* or the California Orchard Moth, as it may be called, flies in California in early fall. In this valley it comes out in September but I have had imagos emerge in confinement as late as the middle of October. Seen flying through the streets of the towns, as it occasionally does, it appears to be a very wary insect but in the prune orchards, where it flies in countless numbers, it may be taken very easily for the flight there is low and lazy and sometimes as many as five or six may be taken with one sweep of the net. They are strictly diurnal and begin flying from ten to eleven in the morning and remaining on the wing until about three in the afternoon. The condition of the weather seems to have no effect on their flying habits. The female is much rarer than the male. Upon emergence, she frequently finds herself the center of attraction of a cluster of frenzied suitors. I have occasionally noticed the fact, reported by Wright, that when a male touches the female with his antennae, be becomes alarmed and leaves the spot with all possible speed. The flight of an ova laden female is very labored and slow and she is frequently obliged to rid herself of some of her burden before being able to reach the proper situation. Eggs are thus commonly found on the bark at the base of trees and even barb-wire fences are sometimes studded with them. Once upon a suitable twig, the female commences to oviposit. Sometimes she stations herself above with her head pointing towards the end of the branch, or rarely towards the trunk, and stretching her abdomen, places the eggs in a solid, naked belt about the twig, without releasing her legs. Again she may hang suspended from the twig and thus oviposit. Egg laying appears to be a rather tedious business as she sometimes remains on the same branch for a whole day or even more. I do not believe, however, that she deposits all her eggs in a single mass. The greatest number of eggs which have been found in a single ring numbered 301. Often two or three masses will be found adjacent to one another. These are undoubtedly laid by different females, as can be seen by the different coloration. The eggs are subovate in shape and vary in color from stone color to a much darker brown. The condition of the weather has much to do with this as eggs laid in confinement are very lightly and uniformly colored. The eggs are affixed to the twigs by a practically insoluble substance. The young larvae emerge in early spring, as soon as the leaves of their food plant have grown sufficiently enough to afford them food. They do not devour the empty egg shells. They are gregarious and remain so until the last or next to the last moult. As to the stinging propensities of the larva, Riley (5th Annual Report Missouri State Entom., p. 126) writes: "The other species of the tribe to which *maia* and *io* belong, will doubtless prove to have the same properties in the larva state; and Mr. G. M. Levette, of Indianapolis, Ind., informs me that *Pseudohazis eglanterina* (Boisd.), which, like *maia*, deposits its eggs in a belt, also possesses urticating power; as he was cautioned against the too free handling of some larvae received from California and which fed on wild rose." As Riley points out, this is caused by the prick of the sting spines, and not by their getting broken in the flesh. As the spines are hollow, it might be supposed that the urticating power proceeds from a poisonous injection, but no apical aperture to the spines has yet been discovered. I have never myself investigated the irritating effects of the spines, but Mr. Grundel tells me that he believes that the sting can only be caused when the larva is diseased or parasitized or when moulting.

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[1] Holland, Moth Book, p. 93, 1903.
[2] Smith, Cat. North American Lepid., 1903.
Grote, Die Saturniiden 1896.

The pupa is invariably formed in the ground or in the rubbish at the base of the tree. In confinement, however, the pupa is almost always naked. Considerable difficulty will be met with in breeding Pseudohazis unless they are given plenty of room, moisture and shade. Dryness kills them very quickly. It is best to have a thick layer of damp leaves in the bottom of the breeding cage. They are also heavily parasitized by Tachina flies. I am glad here to acknowledge my indebtedness to Mr. J. G. Grundel of Alma and Mr. Earl Morris of San José for various favors and notes.

NOTES ON GEOGRAPHIC DISTRIBUTION.

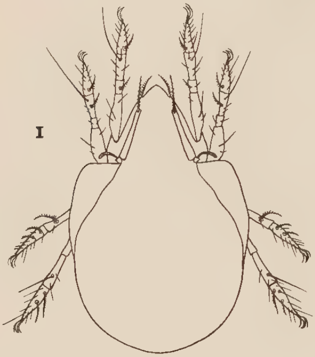
THE DISTRIBUTION OF BLEPHAROCERA TENUIPES WALKER.— The only record for this species in New England is the White Mountains, N. H. In 1906 several days were spent collecting in the vicinity of North Adams, Mass. At Briggsville two miles northeast of the town, a number of specimens were taken on June 18, and at the "Cascade," on the road to Mt. Greylock, several were collected June 20. During the present summer the species was obtained at Mink brook, near Hanover, N. H., July 6, along Bloody brook, Norwich, Vt., July 7 and 8, and at School House brook, West Dummerston, Vt., July 14. It probably frequents most of the cold, rocky streams throughout a large portion of New England. The species has also been collected by Mrs. Annie T. Slosson at Hot Springs, N. C.

C. W. JOHNSON.

EUREMA LISA AT LANGDON, N. H.— On August 14, 1908, I took a fresh female *Eurema lisa* at Langdon, N. H., about four miles north of the locality in Alstead from which my brother has reported it. It is evident that the species breeds in that neighborhood.

W. L. W. FIELD.

PLATE III.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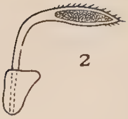
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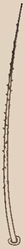
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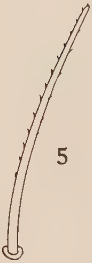
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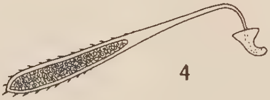
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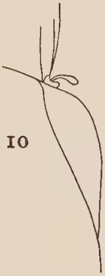
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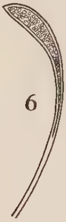
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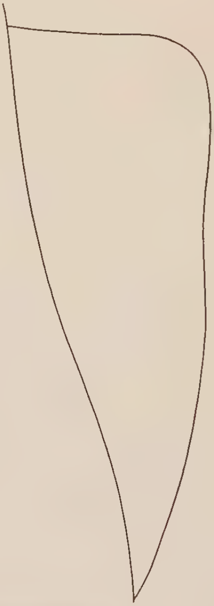
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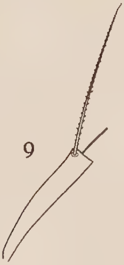
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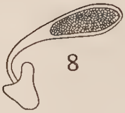
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H. E. Ewing, del.

Ewing: New Species of Oribata.

NEW SPECIES OF THE GENUS ORIBATA.—PLATE III.

BY H. E. EWING, URBANA, ILLINOIS.

The genus *Oribata* is the richest in numbers of any of the American genera of the Oribatidae or "beetle mites." Four new species are described in the present paper. Type specimens have been deposited in the Illinois State Laboratory of Natural History.

Oribata badia n. sp.

(Figs. 1, 2, 3.)

Chestnut brown; integument granulate.

Cephalothorax three-fifths as long as abdomen; lamellae long and narrow, two thirds as long as the cephalothorax and of almost uniform width; lateral lamellae very small. There is a pair of tectopedia for the first pair of legs. Lamellar hairs about as long as the lamellae, straight, pectinate and directed forwards; anterior lateral hairs three-fifths as long as the lamellar hairs and slightly curved. Pseudostigmatic organ almost as long as femur of leg I, recurved, with pointed, clavate head. The palpi may often be seen from above extending out from under the rostrum.

Abdomen almost as broad as long; ptermorphae attached to the anterior half of the abdomen, truncate and not extending beyond the anterior margin of the same; anterior free margin of pteromorphae straight. Genital covers each almost twice as long as broad, and much broader at the posterior than at the anterior end, and situated approximate to the anterior margin of ventral plate; anal covers much larger than genital covers, almost rectangular in shape and situated approximate to the posterior margin of the ventral plate and more than their length from the genital covers. Abdomen hairless.

Anterior pair of legs about as long as abdomen; tarsus and tibia subequal, genual one-half as long as tibia, femur one and one-half times as long as tibia. All the legs are well clothed with stout, curved bristles. Unguis tridactyle; dactyles unequal.

Length, 0.55 mm.; breadth, 0.38 mm.

Under rubbish. Collected by the writer at Urbana, Illinois. A few specimens.

Oribata albida n. sp.

(Figs. 4, 5.)

Very pale yellowish brown; integument finely punctate, especially on the pteromorphae.

Cephalothorax two-thirds as broad as long; lamellae long and narrow, two-thirds as long as cephalothorax; without cusps, broadest in the middle; no translamella. Lateral lamellae present; very narrow and about two-thirds as long as lamellae, each bearing a long, stout, curved, pectinate bristle. Lamellar hairs rather short, one-half as long as lamellae, and extending almost to the tip of rostrum Interlamellar hairs situated in approximation to the base of the lamellae and slightly longer than the lamellar hairs. Pseudostigmatic organ strongly recurved with long peduncle and slightly pectinate, clavate head.

Abdomen two-thirds as broad as long; pteromorphae not extending beyond the anterior margin of abdomen; triangular, anterior free edge concave. Genital covers small, about two-thirds as long as anal covers, situated about two and one-half times their length in front of the latter. Abdomen hairless.

Anterior pair of legs almost as long as abdomen. Unguis tridactyle.

This species resembles *O. clavipectinata* Ewing somewhat, but it is of a much lighter color; the pseudostigmatic organs are very slightly pectinate, instead of being strongly pectinate, and the interlamellar hairs are approximate to the base of the lamellae, instead of being in the normal position.

Length, 0.44 mm.; breadth, 0.28 mm.

Under old boards. Collected by writer at Tuscola, Illinois. Many specimens.

Oribata corpuscula n. sp.

(Figs. 6, 7.)

Dark brown; integument heavily chitinized, surface smooth.

Cephalothorax very long, being about one-half as long as the abdomen and almost hidden above by the large lamellae, which extend the entire length of the cephalothorax and project slightly beyond the tip of the rostrum. Lamellae about one-third as broad as long, being broadest across the middle; lamellae usually contiguous. The lamellar hairs arise from the corners of the lamellae next the median line and are short, straight, and pectinate. Pseudostigmata cylindrical; pseudostigmatic organ clavate, two-thirds as long as the cephalothorax.

Abdomen globose. The line between the abdomen and the cephalothorax is almost straight. Anal covers almost semicircular and situated two-thirds their length from the posterior margin of the abdomen. Genital covers rectangular, about one-half as long as the anal covers, and situated about two and one-half times their length from the anal covers.

Legs stout, subequal in length. The front pair project about one-half their length in front of the tip of the rostrum, while the hind pair do not project beyond the posterior margin of the abdomen.

Length, 0.46 mm.; breadth, 0.30 mm.

In moss. Collected by the writer at Arcola, Ill. Four specimens.

Oribata maxima n. sp.

(Figs. 8, 9, 10.)

Rather dark brown; surface of integument smooth.

Cephalothorax about one-half as long as abdomen; lamellae a little over one-half as long as cephalothorax, narrow, without cusps, and of about equal width throughout their length; translamella similar to lamella but only about one-half as broad and two-thirds as long as lamella. Lateral lamella a mere ridge. A small pair of tectopedia present. Lamellar hairs long, straight, and pectinate, a little longer than the lamellae from which they extend; interlamellar hairs situated in front of pseudostigmata and near the base of the lamellae. They are equal to the lamellar hairs; anterior lateral hairs two-thirds as long as lamellar hairs, slightly curved and very slightly pectinate, instead of being strongly pectinate, as is usually the case. Pseudostigma short, funnel-shaped, and projecting slightly from the surface of the dorso-vertex; pseudostigmatic organ clavate, recurved and about one-half as long as the lamella.

Abdomen globose; pteromorphae small, triangular, about one-fourth as long as abdomen, truncate in front and not extending beyond the anterior margin of abdomen. Genital covers slightly broader anteriorly than posteriorly, situated one and one-half times their length in front of the larger anal covers. Abdomen hairless.

Anterior pair of legs about as long as abdomen; tibia and tarsus subequal; genual less than one-half as long as tibia; femur three times as long as genual. Femora of legs III and IV somewhat enlarged. Unguis tridactyle, dactyles equal.

Length, 0.80 mm.; breadth, 0.58 mm.

Under bark and in moss. Collected by J. D. Hood, Urbana, Illinois. Several specimens.

EXPLANATION OF PLATE.

Fig. 1. *Oribata badia* n. sp. × 60.
Fig. 2. " " pseudostigma and pseudostigmatic organ, × 342.
Fig. 3. " " lamellar hair, × 342.
Fig. 4. " *albida* n. sp., pseudostigma and pseudostigmatic organ, × 550.
Fig. 5. *Oribata albida* lamellar hair, × 550.
Fig. 6. " *corpuscula* n. sp., pseudostigmatic organ, × 342.
Fig. 7. " " right pteromorpha, × 342.
Fig. 8. " *maxima* n. sp., pseudostigma and pseudostigmatic organ, × 342.
Fig. 9. *Oribata maxima* lamella and lamellar hair, × 97.
Fig. 10. " " right pteromorpha and adjacent parts, × 67.

A LIST OF THE NORTH AMERICAN PSEUDOSCORPIONIDA.

BY KARL R. COOLIDGE, PALO ALTO, CALIFORNIA.

THE *Pseudoscorpions*, like other *arachnida*, have been sadly neglected by American entomologists. This can be attributed, in a great measure, to the dearth of systematic literature. The first paper of any importance to appear was Dr. Hagen's "Synopsis Pseudoscorpionidum, synonymica," published by the Boston Society of Natural History (Proc. vol. xiii, pp. 263–272, 1870). Later, Banks published several papers, including "Notes on North American Chernetidae"[1] and "Notes on the Pseudoscorpionida,"[2] the latter superseding. Since then a number of new species have been described and many more will be added when our southern and western faunas are more carefully studied. A number of European papers have also appeared, but these are scarcely accessible to the average student. The habits of the *Pseudoscorpions* should prove a very interesting field for investigation. Berger (Ohio Nat. vi, 489, 1900) has recorded quite fully the life history of *Atemnus elongatus* Banks. I hope in the near future to be able to give a full bibliography of this interesting group.

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[1] Can. Ent. XXIII, p. 160, 1891.
[2] Journ. New York Ent. Soc. V, 3, p. 1, 1895.

FAMILY CHELIFERIDAE.

Sub-family CHELIFERINAE.

helifer cancroides Linn.
Linn., Faun. Suec., ed. XXI, 345, 1767.
Latr., Gen. Crust., I, 32, n. I.
Cuv., Règne Anim., ed. Voigt., IV, 406.
Hagen, Rec. Am. Ent., 51, 1863.
Hagen, Syn. Pseud. Synonymica, 263, 1870.
Banks, Journ. N. Y. Ent. Soc., 3, 3, 1895.
Tullgren, Ent. Tidskr. XX, p. 161–182, 1899.
= *europaeus* De Geer.
De Geer, Mém., VII, 355.
= *fuscus* Geof.
Geoffr., Hist. Abrég., II, 618.
= *granulatus* Koch.
Koch, Arachn., X, 37, t. 377.
= *hermanni* Leach.
Leach, Zool. Misc., III, 49, n. I.
= (?) *ixoides* Hahn.
Hahn, Arachn., 11, 53, t. 60.
Koch, Arachn., X, 39, t. 338.
cf. Menge, Chernet., 30.
= *latreillii* Leach.
Leach, Zool. Misc., III, 49, n. 2. (An sexus alter ch. Hermann? teste Leach.)
= *Obisium cancroides* Walck.
Walcken., Faun. Paris, II, 253, n. 2.

A wide-spread and common species occurring throughout Europe and North merica.

helifer biseriatum Banks.
Banks, Journ. N. Y. Ent. Soc., 3, 3, 1895.
Berger, Ohio Nat. VI, 407, 1905.
Lake Poinsett and Punta Gorda, Florida and Berea, Ohio.

helifer floridanus Banks.
Banks, Can. Ent. XXIII, 162, 1891.
Known only from Southern Florida.

Chelifer muricatus Say.

Say, Journ. Acad. Phila., II, 63, 1821.

Say, Comp. Writings, Leconte Ed. 2, 1891.

Hagen, Rec. Am. Ent. 51, 1868.

Banks, Journ. N. Y. Ent. Soc. 3, 3, 1895.

Common in the eastern and middle western states. Alabama, Florida, Kentucky, New York, Long Island, Virginia, Ohio.

Chelifer scabrisculus Simon.

Simon, Ann. Soc. Ent. Fr., 1878.

Banks, Journ. N. Y. Ent. Soc. 3. 4, 1895.

= *degeneratus* Balzan.

Balzan, Ann. Soc. Ent. Fr., 1891.

A western species, reported from Southern California, Lake Tahoe, Oregon and Utah. I have found it very common about San Francisco Bay.

Chelifer mirabilis Banks.

Banks, Journ. N. Y. Ent. Soc. 3, 4, 1895.

A cave species, described from Barren County, Kentucky and Pennington Gap Virginia.

Chelifer hubbardi Banks.

Banks, Proc. U. S. Nat. Mus. XXIII, 5888, 1901.

Southern Arizona.

Chelanops oblongus Say.

Say, Journ. Acad. Phila., 64, 2, 1821.

Say, Comp. Writings, Leconte Ed. V. 2, 1891.

Hagen, Syn. Pseud. Synonymica, 267, 1870.

Banks, Journ. N. Y. Ent. Soc. 3, 5, 1895.

Berger, Ohio Nat. VI, 407, 1905.

= *alius Leidy.*

Leidy, Proc. Phila. Acad. Sci., 266, 1877.

Well distributed throughout the eastern and southern states.

Leidy's specimens were taken from an Elaterid beetle, *Alaus ocullatus.*

Chelanops grossus Banks.

Banks, Can. Ent. XXV, 65, 1893. (*Chernes grossus.*)

Banks, Proc. U. S. Nat. Mus. XXV, 220, 1903.

Colorado and Southern Arizona.

Chelanops texanus Banks.

Banks, Can. Entom. XXIII, 162, 1891. (*Chelifer texanus.*)

Banks, Journ, N. Y. Ent. Soc. 3, 5, 1895.
Known only from Brazos County, Texas.

Chelanops acuminatus Simon.
Simon, Ann. Soc. Ent. Fr., 1878. (*Chelifer acuminatus.*)
Found in California and Washington.

Chelanops floridae Balzan.
Balzan, Ann. Soc. Ent. Fr., 1891.
Banks, Journ. N. Y. Ent. Soc. 3, 5, 1895.
Florida.

Chelanops latus Banks.
Banks, Can. Ent. XXV, 64, 1893.
Florida.

Chelanops dentatus Banks.
Banks, Journ. N. Y. Ent. Soc. 3, 6, 1895.

Chelanops latimanus Banks.
Banks, Journ. N. Y. Ent. Soc. 3, 6, 1895.
Punta Gorda, Florida.

Chelanops virginica Banks.
Banks, Journ. N. Y. Ent. Soc., 3, 6, 1895.
Described from Fredricksburg, Virginia.

Chelanops tristis Banks.
Banks, Can. Entom. XXIII, 163, 1891.
Found along the sea-shore at Long Island, N. Y.

Chelanops morosus Banks.
Banks, Journ. N. Y. Ent. Soc. 3, 7, 1895.
Isle Royale, Lake Superior.

Chelanops tumidus Banks.
Banks, Journ. N. Y. Ent. Soc. 3, 7, 1895.
Indian River, Florida.

Chelanops validus Banks.
Banks, Journ. N. Y. Ent. Soc. 3, 7, 1895.
Described from Lake Tahoe. It is plentiful in Santa Clara Co., Cal.

Chelanops pallipes Banks.
Banks, Can. Ent. XXV, 64, 1893.
Occurs in California and Colorado.

Chelanops sanborni Hagen.
Hagen, Record Am. Ent., 1868.
New York, Mass., and Indiana.

Chelanops dorsalis Banks.
Banks, Journ. N. Y. Ent. Soc. 3, 8, 1895.
Lake Tahoe, California.
Chelanops pallidus Banks.
Banks, Can. Ent. XXII, 152, 1890.
Ithaca, New York and Lawrence County, Indiana.
Chelanops affinis Banks.
Banks, Insect Life, May, 1894.
Crescent City, Florida.
Chelanops arizonensis Banks.
Banks, Proc. U. S. Nat. Mus. XXIII, 589, 1901.
Southern Arizona.

Sub-family GARYPINAE.

Garypus bicornis Banks.
Banks, Journ. N. Y. Ent. Soc. 3, 8, 1895.
Found between the laminae of rocks at Specimen Ridge, Yellowstone National Park.
Garypus floridensis Banks.
Banks, Journ. N. Y. Ent. Soc. 3, 9, 1895.
Indian River, Florida.
Garypus granulatus Banks.
Banks, Can. Ent. XXIII, 163, 1891.
Ithaca, New York.

FAMILY OBISIIDAE.

Sub-family OLPINAE.

Olpium obscurum Banks.
Banks, Can. Ent. XXV, 65, 1893.
Florida.
Atemnus elongatus Banks.
Banks, Journ. N. Y. Ent. Soc. 3, 10, 1895.
Berger, Ohio Nat., VI, 489, 1906.
Florida.

Sub-family Obisiinae

Tribe Ideobisiinae

Ideobisium threventi Simon

Simon, Ann. Soc. Ent. Fr., 1878. (*Obisium threventi.*)

A common western species, reported from California, Oregon, Washington and Arizona.

Ideobisium rufulum Banks.

Banks, Can. Ent. XXIII, 166, 1891. (*Olpium rufulum.*)

Washington, D. C., and Virginia.

Ideoroncus obscurus Banks.

Banks, Can. Ent. XXV, 66, 1893.

Banks, Journ. N. Y. Ent. Soc. 3, 11, 1895.

Washington, Montana and California.

Tribe Obisini.

Obisium cavicala Packard.

Packard, Am. Nat., Febr., 1884.

Banks, Journ. N. Y. Ent. Soc. 3, 11, 1895.

From New Market Cave, Virginia.

Obisium brunneum Hagen.

Hagen, Rec. Am. Ent., 1868.

Banks, Journ. N. Y. Ent. Soc. 3, 11, 1895.

An abundant species in the northern states.

Obisium parvulum Banks.

Banks, Journ. N. Y. Ent. soc. 3, 12, 1895.

Florida ?

Obisium macilentum Simon.

Simon, Ann. Soc. Ent. Fr., 1878

Southern California.

Obisium carolinensis Banks.

Banks, Journ. N. Y. Ent. Soc. 3, 12, 1895.

North Carolina and Lee County, Virginia.

Blothrus californicus Banks.

Banks, Can. Ent. XXIII, 165, 1891. (*Atemnus californicus.*)

Inhabits California.

Tribe CHTHONINI.

Chthonius packardi Hagen.
  Hagen, Zool. Anz., July, 1879.
  Indian Cave and Mammoth Cave, Kentucky and Wyandotte Cave, Indiana.
Chthonius coecus Packard.
  Packard, Amer. Nat., Feb. 1884.
  Weyer's Cave, Virginia.
Chthonius pennsylvanicus Hagen.
  Hagen, Rec. Amer. Ent., 1868.
  Banks, Can. Ent. XXIII, 164, 1891.
  Berger, Ohio Nat. VI, 407, 1905.
  Penna., New York and Florida.
Chthonius moestus Banks.
  Banks, Can. Ent. XXIII, 165, 1891.
  Ithaca, New York.
Chthonius spinosus Banks.
  Banks, Can. Ent. XXV, 67, 1893.
  Citrus County, Florida.
Lechytia pacifica Banks.
  Banks, Can. Ent. XXV, 66, 1893. (*Roncus pacificus.*)
  Olympia, Washington.

NEW ENGLAND FEDERATION OF NATURAL HISTORY SOCIETIES.— By invitation of the Vermont Societies the next meeting of the Federation will be held with them at Middlebury, Vt., on Thursday, Friday and Saturday, January 21, 22, 23. The Vermont Botanical and Bird Clubs will hold their regular winter meetings and there will be a general meeting of the Federation, an Exhibition and visits to the collections at Middlebury and Burlington. A circular giving further details will be issued about January 1.

J. H. EMERTON, *Secretary.*

DESCRIPTIONS OF THREE NEW NORTH AMERICAN CHALCIDOIDEA OF THE SUBFAMILIES MYMARINAE AND APHELININAE.

BY A. ARSÈNE GIRAULT, OFFICE OF THE STATE ENTOMOLOGIST, URBANA, ILLINOIS.

Family MYMARIDAE.

Subfamily Mymarinae.

Tribe *Mymarini*.

1. *Stichothrix bifasciatipennis* species nova.

Female: — Length 2.108 mm.; wing expanse 3.199 mm.; length of forewings 1.454 mm.; width of forewings 0.364 mm. Comparatively, very large.

General color, dark reddish brown; antennae, legs, and venation in general, yellowish brown, paler; club and 4–5 apical funicle joints of antennae intermediate in color, somewhat dusky, as are also the coxae and femora of the intermediate pair of legs, the femora of the anterior and intermediate legs, and the tibiae of the intermediate legs; the apical three-fourths of the posterior tibiae very dark, more dusky than the general color of the body; the tarsi, and the tibiae of the anterior legs, lemon yellow; articulations of the leg segments and their extremities, pallid; trochanters pale yellow; apical tarsal joints dusky.

Head (caudal aspect) subquadrate, narrower cephalad, the eyes rather small, dark, the vertexal carina present, dark; the three ocelli in a slightly curved line, the middle one more cephalad, the distance between them being about the same as the distance between either of the lateral ones and the margins of the eyes. Thorax slender, not as long as the body of the abdomen, the parapsidal furrows distinct, complete, curved; the scutellum with a longitudinal furrow on each side of the median line (evident on one side in one specimen only); the base of the mesoscutum straight. Abdomen compressed, from lateral aspect acutely ovate, its petiole longer than the posterior trochanters, the sheaths of the ovipositor exserted distinctly beyond the tip of the abdomen, the ovipositor issuing far anterior to the tip of abdomen. Body impunctate, smooth, with scattered setae. Metathorax apparently noncarinate.

Legs long and slender, especially the posterior pair, which greatly exceed the length of the addomen, and are about as long as the abdomen and thorax combined; the proximal tarsal joint of the cephalic legs subequal in length to the three remaining joints combined, slightly curved; those of the intermediate and posterior legs longer, distinctly longer than the combined length of the three distal joints; posterior tibiae lengthened, about as long as the tarsi, shorter in the case of the other legs; posterior coxae also lengthened, the femur shortened and somewhat thickened, the coxae and trochanters combined, distinctly exceeding the femur in length; posterior trochanters slenderer and shorter than the posterior coxae, but at least one-half the length of the posterior femur. Tibial spurs minute, more so on the intermediate legs, two on the posterior legs, and largest on the anterior legs.

Fore wings spatulate, rather broad, and moderately thickly ciliate in the discal portion, excepting the usual naked basal portion and a nearly naked area in the middle transparent portion; discal cilia moderately long, dusky; marginal cilia normal, dusky, moderate in length. Marginal vein as long as the apical tarsal joint, pale brown, a single seta arising from its surface just before apex. Fore wings hyaline, with three fuscous transverse bands across them, the proximal one at the marginal vein, small, irregular, and not conspicuous, the second, the largest, crossing the middle of the wing, regular, subquadrate, conspicuous, ciliate, and the third or distal, crossing the outer fifth of the wing, somewhat irregular, subsagittate, or nearly diamond-shaped, but the caudal margin is confused; both fuscous areae somewhat variable in shape; a portion of the lower middle of the distal fuscous area naked; bare spots on the wing somewhat irregular; the small basal fuscous area naked. Hind wings inconspicuous, linear, and very slender; their apices, and toward the base, dusky; marginal cilia moderate.

Antennae not as long as the body, funicle filiform. Scape short, thickened in the middle, longer than the pedicel by at least a third; pedicel short, one side convex, about three-fourths the length of the next joint; funicle 1 cylindrical, slender, not one-half as thick as the scape, two-thirds the length of funicle 2; the latter and funicle 3 subequal, but funicle 2 slightly longer; funicle joints 4 and 5 subequal, shorter, not quite as long as funicle 1, but exceeding the pedicel and funicle 6 in length; the latter still shorter, distinctly the shortest funicle joint, subequal in length to the pedicel and distinctly thicker than the preceding funicle joints, oval in shape; club apparently undivided, thick, oval, at least twice wider than the scape or pedicel, and subequal in length to, or longer than, funicle joints 2 and 3; the club and funicle joints 2 and 3, the longest joints. Antennae moderately hairy, the setae minute, smooth; thickening very slightly at funicle joints 4 and 5, more noticeably at funicle 6, and abruptly at the club.

(From 2 specimens. ⅔-inch objective, Bausch & Lomb.)

Male: — Unknown. One of the largest mymarids yet discovered. The species is easily visible to the naked eye, and then appears to be black, with two-banded wings. No other species of this genus has yet been discovered in North America.

Seen through a lens (½-inch, Coddington), the species appears as under the microscope (⅔-inch objective, Bausch & Lomb).

Described from 2 balsam slides of females, received from Dr. L. O. Howard, Chief of the Bureau of Entomology, U. S. Department of Agriculture, Washington, D. C., and labeled as follows: "9900^c. appears to be a parasite of eggs of *Anazipha exigua.* D. C. May 6, 1905." and "9900^c. from eggs of *Anazipha exigua.* D. C. May 29, 1905." Dr. Howard further informs me that the host eggs of this parasite were in the stems of rose mallow on the grounds of the Department of Agriculture, Washington, D. C. Reared by Mr. Theodore Pergande.

Type: — *No. 11,846,* U. S. National Museum, Washington, D. C., 1 female. *Cotype,* Accession *No. 37487,* Illinois State Laboratory of Natural History, Urbana, Illinois, 1 female.

Family EULOPHIDAE.

Subfamily APHELININAE.

Tribe *Aphelinini.*

1. *Prospaltella fasciativentris* species nova.

Female: — Average length 0.836 mm.; wing expanse, excluding cilia, 1.745 mm.; width of fore wing, 0.29 mm.; length of fore wing, 0.691 mm.

Ground color, dull pale cadmium yellow. The abdomen piceous, shining. Head varicolored; the face silvery white bounded below (the oral surfaces and cephalic cheeks) with piceous, deeply concave; face and clypeus transversely rugulose; the oral opening pale yellow; cheeks finely lined; vertex pale cadmium yellow with some dusky, rugulose transversely; postgenae silvery, finely lined, lower half piceous; occipital region silvery, darker cephalad, with a single, irregular transverse fascia of dusky running through the middle, and originating with the lower piceous portion of the postgenae, margined with dusky caudad (above), finely lined; ocelli ruby red, in a triangle, the distance between the lateral ocelli is greater than the distance between each and the margin of the eye, and the distance between each and the cephalic ocellus; cephalic margin of vertex concave; a distinct dark carina, tracing a concave line from eye to eye, on the caudal margin, touching each lateral ocellus; eyes dark reddish, ovate, moderately coarse, and bearing moderately thick, short, whitish hairs from its surface.

Thorax pale cadmium yellow, the mesoscutum, excepting a marginal path on the lateral and caudal sides, is dusky, making a large triangular dusky marking in the center of the mesothorax; this also involves the pronotum, and its edges are irregular; the entire surface of the mesoscutellum is dusky, excepting the distinct median line, and the extreme margins, and the large axillae are dusky discally, the margins concolorous with the ground color; also the discal surfaces of the parapsides dusky; the mesal aspect of the mesopostscutellum silvery white; otherwise piceus, together with the metanotum, excepting occasionally at the meson; tegulae pallid to dusky. Mesothorax delicately polygonally sculptured, somewhat coarser and more irregular on the scutellum; median line of scutellum longitudinally striate; the sculpture of the axillae similar to that of the scutellum. Caudal margin of mesoscutum straight; scutellum suboval. Thorax caudad of mesoscutellum, shining; about equal in length to the abdomen or shorter; with a few dark setae scattered over its surface.

Abdomen shining piceous black, ovate, the tip silvery white, and a broad transverse fascia of silvery white across the basal third; this is inclined to be wider toward the lateral margin; incisions of segments paler, but not conspicuous; at least the ventro-lateral aspect of the abdomen faintly lined; the dorso-lateral aspect with a silvery sheen. Anal glands distinct, ovipositor slightly exserted.

Wings normal, the venation pale yellowish; the whole of the distal half fuscous, more deeply so in a subquadrate area immediately caudad of the stigmal vein, and less so just distad of the stigmal vein along the costal border of the wing; the dusky area involves about half of the distal third of the marginal vein, and is similar in general to that in the species *murtfeldtii* Howard, but broader and less regular in outline; basal portion of the forewings under the submarginal vein very slightly dusky; cilia less dense in the basal part of the wing, under the submarginal vein; a triangular area just proximad of the basal margin of the fuscous area nearly naked, excepting two or three rows of cilia just below the marginal vein, and two very faint rows through the naked area; at least 5 setae arise from the cephalic edge of the marginal vein, 7 from the submarginal, and 1 from the tegula.

Hind wings normal, hyaline, the distal third of the submarginal vein (that portion not touching the costal border) moniliform; submarginal vein bearing at least four setae from its cephalic edge and the marginal from nine to eleven setae from its surface; fore wings and hindwings densely, uniformly ciliate in the disk, the latter having at least six or seven rows of cilia at the point indicated by a line drawn transversely across the wing through the apical end of the marginal vein (usually from 6 to 9 rows).

Entire legs pale cadmium yellow to pallid, the tibiae and tarsi marked as in *murtfeldtii* Howard; apical tarsal joint blackish at the extreme tip; anterior femora, however, with a dusky ring around the middle and a less distinct one near its apical end.

Antennae varicolored; basal half of scape, the two apical funicle joints, and the apical joint of club silvery white, with a tinge of yellowish. Apical half of scape, the pedicel and funicle dusky; apical joint of club and funicle 2, more dusky than the silvery white funicle 3; scape slender, reaching to apex of vertex, much longer than the three following joints; pedicel at least one-half longer and also broader than funicle joint 1, cylindrical, tapering caudad; funicle 1 and 2 subequal in length, funicle 2 slightly longer and broader; funicle 3 one-third longer and broader than funicle 2, broader than the pedicel, and subequal in width to the first joint of the club; three club joints gradually tapering, the basal the broadest, subequal in length to club 2, the second slightly narrower and the third, or apical joint, conical, but nearly as long as the others, and abruptly paler.

Flagellum uniformly moderately hairy with white hairs.

(From 5 specimens, killed 24 hours after emergence. $\frac{2}{3}$-inch objective, Bausch & Lomb).

Male: — Unknown. Nearest to *Prospaltella murtfeldtii* Howard, but differing in antennal structures, coloration, especially in the color of the abdomen, the presence of the dense cilia on the discal surfaces of the hind wings, the carinated vertex, and in sculpture; also somewhat similar to *maculata* Howard in general appearance, but with the characteristics entirely distinct.

Seen with the naked eye, the species is very dark; through a lens (Coddington, $\frac{1}{2}$ inch) the head and thorax are pale cadmium yellow, the thorax with whitish or paler markings and a distinct median line caudad of the mesoscutum; the abdomen appears black, with a distinct silvery or milky white tip, and transverse fascia of the same color across the basal third; the legs and antennae banded, and the distal half of the wings distinctly dusky or clouded, and the base less distinctly so. Seen from the side there is a more or less distinct continuous stripe of silvery white along the thorax and abdomen.

This beautiful species was first reared by Mr. James A. West of this office, in July, 1907, when a single female issued from twigs of fruit trees infested with the San José scale, *Aspidiotus perniciosus* Comstock, obtained at Urbana, Illinois; apparently other hosts were not present. Subsequently reared by myself, in the insectary of this office, from apple twigs infested with *Chionaspis furfura* Fitch, obtained at Urbana, Illinois, on April 3, 1908. Females only were reared.

I have since been informed by Dr. L. O. Howard (*In litt.*, Nov. 23, 1908) that the thirteen specimens of *Prospaltella* reared from new species of *Aspidiotus*, by

Johnson at Champaign, Illinois and determined as *murtfeldtii* by Howard in the last paragraph of page 40, of Bulletin No. 1, technical series, Division of Entomology, U. S. Department of Agriculture, under the original description of *murtfeldtii*, are in reality *fasciativentris*.

Types: — Accession *No. 37481*, Illinois State Laboratory of Natural History, Urbana, Illinois, 3 ♀s in xylol-balsam.

2. *Prospaltella fuscipennis* species nova.

Female:— Size, normal for the genus. General color silvery white, marked with dusky. From lateral aspect, thoracic pleurum silvery white, with a blackish band along the bases of the coxae, the abdomen banded with black; oral area and lower portion of genae black, and a triangular black area visible dorsad, bordering the eye margin; coxae silvery white. Antennae black, excepting apical club joint which is silvery white with some dusky; scape silvery white, excepting black tip. Face silvery white, margins of eyes black. Eyes yellow with some black. From dorsal aspect, head silvery white with some dusky on vertex, and a transverse dusky band just below the occipital margin, beginning laterad at the eye margin; disk of mesoscutum, the axillae and the tegulae dusky; mesoscutellum with the caudo-lateral halves on each side of a rather broad median line, black; all of mesopostscutellum and mesal portions of the metanotum silvery white, the rest dark. The whole of the abdomen dusky, excepting the narrow lighter incisions in the dorsal region, which paleness becomes broader laterad and silvery white. Legs, silvery white; posterior proximal tarsal joint black, the posterior tibiae with two black bands; knee of posterior legs black; other legs as in *maculata* Howard. Whole body delicately polygonally reticulated. Fore wings and hind wings uniformly infuscated, steel bluish, the fore wings hyaline however to insertion laterad from apical bend of the submarginal vein, infuscation deeper beneath (caudad) the stigma; discal cilia of both wings numerous and close, from four to five longitudinal lines in the hind-wings. Venation dusky, usual.

Pedicel wider and longer than the first funicle joint; joints 2–3 of funicle subequal, $\frac{1}{3}$ longer and broader than funicle 1; club joints 1 and 2 subequal, nearly equal to joints 2 and 3 of the funicle; apical club joint conic, as long as the others. Antennal joints uniform; longitudinal carinae prominent.

Ventum of thorax silvery white, of abdomen blue-black.

Male:— Unknown.

Nearest to *fasciativentris* Girault but differing in the uniform coloration of the funicle, lacking broad white band on abdomen, fore wings infuscated further proximad (to the apical bend of the submarginal vein), and deeper in color, and the more noticeable infuscation of the hind wings.

Type:— Accession No. 39306, Illinois State Laboratory of Natural History, Urbana, Illinois, 4 females in balsam. *Cotype — No. 12106*, United States National Museum, Washington, D. C., 1 female in balsam.

Described from six females mounted in balsam, reared from (*Chrysomphalus*) *Aspidiotus obscurus* (Comstock) on oak, Marion, Illinois (W. P. Flint). The parasites were reared in the insectary of this office, August 11–13, 1908. The description of coloration and sculpture was made from unmounted specimens, killed with chloroform.

AUTUMN FLIGHTS OF SPIDERS. At Readville, Mass., November 9, 1908, over two hundred spiders were taken flying or on fences between the railroad station and the bridge across the Neponset river, of the following species.

Adults — *Gonatium rubens, Spiropalpus spiralis, Stylophora nigrina, Tmeticus contortus, T. concavus, T. plumosus, T. bostoniensis, T. tridentatus, Cornicularia directa, Erigone dentigera.*

Immature — *Epeira prompta, E. displicata, E. strix, Singa variabilis, Dictyna volucripes, Theridium murarium, Ero variegata, Amyphena rubra, Pirata insularis, Pardosa glacialis, Dolomedes sexpunctatus.*

The morning had been foggy but had cleared early and the air was nearly still at a temperature of 50°. At 10 A. M. thousands of these spiders were walking up posts and trees along the roadsides and others were floating on threads in the air drifting slowly across the marshes from the southwest. Threads up to ten feet long extended from fences to trees and telegraph poles and floated out in the air, some fine single threads but more of them irregular bands of white silk one eighth of an inch or more wide apparently made by many spiders passing over them.

The most numerous species were *Stylophora nigrina* and *Tmeticus concavus*. *Erigone dentigera*, the most numerous species flying in the cities, was represented by only a few individuals. The largest species were half grown *Pardosa glacialis* and *Dolomedes sexpunctatus* which succeeded in flying off the fences as well as those of lighter weight. Spiders of both sexes, different species and all sizes worked within each other's reach on the same post without fear or any attention to one another. If they chanced to touch they moved apart and went on with their efforts to fly. The flying continued until toward noon when the wind increased and made it impossible. The tops of posts and fences were covered with silk showing that flying had been going on for many days and it continued every calm morning through the month. J. H. EMERTON.

THE SUN-DANCE OF MELISSODES.

C. H. TURNER, AUGUSTA, GA.

THE time was the month of August; the place, an abandoned garden in Augusta, Georgia. In one end of that garden, where a poor stand of grass had supplanted the beans which once flourished there, a host of burrowing-bees, bearing the generic name *Melissodes,* had excavated their burrows. Some of these burrows were exposed in barren spots, while others were hidden, more or less, in clumps of grass. At any hour of the day, these industrious burrowing-bees could be seen storing their nests with pollen; while the cuckoo-bees [*Nomadidæ*] loitered on neighboring grass-blades or hovered about the burrows, waiting for an opportunity to lay their eggs upon the stored-up food of the industrious *Melissodes.* Crossing the path of the breeze and the rays of the sun at every possible angle, active alike in sunshine and shadow, yet disturbed by even slight changes in the topographical environment of the burrow, the female *Melissodes* continues her work from early morn until set of sun; proclaiming, in deeds more eloquent than words: "My behavior is much more than a complex of anemotropisms and phototropisms, for my homing is controlled by memory pictures of the environment of my nest."

At one spot in this garden, a place where the sun shone brightly all the day long, there was a conspicuous patch of grass about five feet long and two feet wide. In and about this grass-plot were situated, at irregular intervals, several burrows of this bee. Usually a burrow was the property of a single female; but in some cases two, and in yet rarer cases three, bees utilized the same burrow. A round trip to the pollen fields required only about twenty minutes. Since all the bees did not start for the forage grounds at the same time, hardly five minutes of daylight passed by without a female *Melissodes* passing near to or across that plot of ground. This patch of grass was the site of the dance of which this article treats. Although daily, for a whole week, several hours were devoted to a study of this dance, yet it was never performed at any other place in the garden.

Many a time have I watched the wind-dance of the Diptera — watched the flies, hovering several feet above the ground, with their heads all facing the wind, rise and fall in rhythmic movements. This sun-dance of *Melissodes* is not such a tropism, for the axis of the body bears no constant relation either to the direction of the wind or to the rays of the sun. Nor is it like any of the human square dances, where a constant number of people arrange themselves in ever shifting geometrical patterns;

this dance of the bees seems to be a free for all performance. Usually several bees are engaged, but as few as one and as many as fifteen have been observed participating at the same time, and the plotting of the curves in which they move would puzzle the brain of a skilled mathematician. Neither is it like the popular round dances, where each couple forms an independent unit; for although one bee often chases and sometimes embraces another, there are no permanent dual units. No more is it like a jig, where each individual is an independent unit; but, it is more like the game of cross-tag, of which so many children are fond. Arranged without any apparent system, and seldom rising more than a few inches above the tops of the grass stalks, the bees dart here and there in irregular lines. Moving in complex curves of short radii, chasing each other, dodging one another, dropping into the grass, knocking each other down, clasping momentarily and rolling upon the ground, darting off for several yards and then returning, at times resting for a moment upon a blade of grass — such behavior, repeated over and over again, sometimes in one order and sometimes in another, is the essence of the sun-dance of *Melissodes*. No skilled musician plays entrancing tunes; but, as they dance, each bee makes music with its wings.

What is the meaning of all this? Were the participants of the dance young females, an explanation would be easy; for it would be considered an instinctive play the function of which is to furnish memory pictures of the environment in which they will excavate their nests. But they are not young females; their yellow clypei, flashing in the sun, proclaim them males. Ever alert for the black clypei of the female, I have scrutinized this dance for hours; but the regular participants always displayed yellow clypei, the badge of maleness. Participants captured in my insect net told the same story. At regular intervals, females do appear, for a moment, in the midst of the dancers. These, however, are not young bees; the conspicuous loads of golden pollen, which burden the dense scopa of their hind legs, proclaim them mature females that are hurrying homeward with food for their offspring. On the appearance of such a female, a male usually darts after her. Often several do so simultaneously. The alert female usually dodges them and continues homeward. The males may even follow her to the burrow, and, hovering about until she reappears, give chase. Sometimes the female's dodging is ineffective and she is struck by the head of the chasing male. In such cases she is knocked to the ground. Although, as a rule, the male drops immediately to the ground, yet the female usually escapes to her burrow. In yet other cases the pursuing male succeeds in securing a more or less hold upon the female. They both then fall to the ground and roll over and over. Even then the female frequently dislodges the male and escapes to her burrow; but, occasionally after a short roll upon the ground, the female walks leisurely along, bearing upon her back, in coition, the victorious male. After a lapse of a few minutes, the female returns to her burrow and the male to his dance. This is the significance of the sun-dance of Melissodes; perhaps it were better to call it a nuptial ambuscade, since it is a device which promotes sexual union.

HAINES NORMAL SCHOOL,
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